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PULMONARY FUNCTION IN CONVALESCENT POLIOMYELITIC PATIENTS*

I. Pulmonary Subdivisions and Maximum Breathing Capacity

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BOSTON

THE severe poliomyelitis epidemics of recent years and the increasing success of treatment during the acute stages of respiratory failure have emphasized the need for more knowledge of the changes in pulmonary function during recovery from respiratory-muscle involvement. Such information would be of value in estimating a patient's progress, in formulating prognosis, and in assessing the effects of therapeutic procedures and the need for respiratory appliances.

The degree of respiratory impairment in the acute phase of poliomyelitis varies markedly from patient to patient, and in convalescence all degrees of recovery occur (as in other types of neuromuscular paralysis). In the acute stages of the disease, many aspects of respiration may be affected, since poliomyelitis may cause atelectasis and pulmonary edema in addition to respiratory-muscle paralysis. In the convalescent stages one might expect to find residua from one or more of the acute disturbances, particularly those affecting lung ventilation.

Previous investigators studying the extent of respiratory deficiencies in poliomyelitis have emphasized the importance of measuring the vital capacity and spontaneous tidal volume.[1, 2] Both measurements are easily obtained and offer much valuable information. Little attention, however, has been paid to ventilatory reserve, the anatomic and functional subdivisions of lung volume and the properties of the lungs and chest that determine the components of lung volume. It is the clinical impression of some persons that during the course of poliomyelitis there is a "collapse" of the chest and a resulting need to stretch the chest. It has also been reported that emphysema may develop during convalescence from this type of respiratory paralysis.[3] Such effects have been attributed to prolonged use of either chest[3] or tank respirators.[3-6]

The present study was undertaken in an attempt to answer some of these questions and, primarily, to describe the natural course of recovery from respiratory-muscle paralysis.

METHODS

Forty-one observations were obtained on 32 patients ranging in age from five and a half to forty-three years and consisting of 20 males and 12 females. The patients were divided into four groups on the basis of a clinical appraisal of their respiratory capabilities. Patients in Group 1 represented the "respiratory cripples" who showed prominent use of the accessory muscles of respiration and who required mechanical respiratory assistance 50 per cent or more of the time. Patients in Group 2 had marked respiratory-muscle involvement and also depended largely on their accessory muscles of respiration. Certain members of this group who used mechanical respiratory assistance did so for less than 50 per cent of the time. Group 3 patients had moderate respiratory-muscle involvement but had either apparently good intercostals or an adequately functioning diaphragm. They had no need of respiratory assistance. Group 4 patients were those who had no clinical impairment of respiratory muscles, although in the past some had had recognized respiratory-muscle weakness. Those patients who had not had recognized respiratory-muscle weakness were included for partial evaluation of the effects of prolonged bed rest on the pulmonary subdivisions and especially on the maximum breathing capacity. Patients in all groups had some involvement of nonrespiratory muscle groups. Most of the respiratory measurements were made with the patient unassisted by mechanical equipment. When mechanical assistance was used, the patients were allowed to breathe spontaneously for a period in order to obtain their spontaneous tidal and resting end-expiratory position.

The studies involved measurements of the pulmonary compartments and the voluntary maximum

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breathing capacity (MBC). The pulmonary volume fractions were determined on a Benedict-Roth type of spirometer. The residual volume was measured with the same apparatus, using the helium-dilution technic and a katharometer[7] after a seven- to eight-minute wash-out with oxygen. The voluntary maximum breathing capacity was measured for fifteen seconds, and the volume of air moved was recorded with the spirometer, modified so that each inspiration was added and recorded at an amplitude reduction of 1:25. The valves and soda-lime container were removed for this test in order to minimize resistance. All respiratory values were corrected to body temperature and saturated at 37°C. at the ambient pressure (BTPS). All studies were made with the patient recumbent or inclined at an angle of 20° to 45°, except patient R. F., on whom the studies were made while he was sitting up.

Table 1. *Physical Characteristics and Pulmonary Function in Convalescent Poliomyelitis Patients.**

Name	Duration Since Onset at Time of Study	Date of Study	Age	Height	Weight	Body-Surface Area	Minute Volume†	Respiratory Rate†
			yr.	cm.	kg.	M^2	LPM	/min.
Group 1								
DF (M)	2 mo.	8/16/49	5½	—	—	—	5.94	35
AM (F)	1⅝ yr.	3/22/49	12	—	—	—	4.85	25
RC (M)	1¾ yr.	5/13/49	12 1/12	138	19.8	0.91	3.86	25
WL (M)	1 mo.	9/20/49	10 3/12	—	—	—	5.17	33
HH (M)	9 mo.	7/19/50	23	180	43	1.53	8.34	19
PO (M)	1 mo.	9/21/49	17 1/12	183	68	1.89	9.18	18
AM (M)	1¼ yr.	11/24/50	34	174	54.5	1.64	4.98	18
DM (F)	1 1/6 yr.	11/24/50	20	173	44.5	1.52	5.56	20
CH (F)	3 mo.	11/27/50	16	173	39	1.44	—	—
LA (M)	1 1/12 yr.	11/27/50	27	188	51	1.70	4.08	15
JT (M)	3 mo.	11/27/50	6½	125	18	0.82	—	—
PG (F)	2 mo.	11/29/50	15	157	37	1.30	—	—
AM§ (M)	1⅝ yr.	4/10/51	34	174	53.5	1.62	4.94	19
DM§ (F)	1½ yr.	4/10/51	20	173	44.5	1.52	4.35	19
CH§ (F)	8 mo.	4/11/51	16	173	39	1.44	4.18	15
PG§ (F)	7 mo.	4/11/51	15	162	37	1.33	4.55	21
JT§ (M)	8 mo.	4/17/51	7	126	17.5	0.80	1.92	16
LA§ (M)	1 ½ yr.	4/17/51	27	188	51	1.70	4.00	14
JK (M)	1 mo.	8/23/51	31	177	57	1.71	—	—
Group 2								
DS (M)	9 mo.	5/22/50	8	130	16.5	0.82	5.94	19
BD (F)	1 mo.	8/25/50	11	148	24	1.03	8.59	25
WL§ (M)	9 mo.	5/22/50	11 1/12	146	21.5	0.98	6.23	16
SR (F)	2¾ yr.	5/13/50	14 4/12	157	27.5	1.15	5.68	23
SH (F)	7 mo.	5/24/50	20	160	44.5	1.43	5.58	19
BK (F)	8 mo.	5/19/50	33	164	45	1.46	9.26	19
RE (F)	7 mo.	5/23/50	18	158	40.5	1.36	6.71	15
PO§ (M)	9 mo.	5/23/50	18	186	52	1.69	7.92	17
ND (M)	1 1/6 yr.	11/27/50	28	183	56.5	1.76	8.20	23
KM (M)	6 mo.	4/16/51	43	172	55	1.64	5.10	16
ND§ (M)	1 7/12 yr.	4/16/51	28	183	56.5	1.76	5.28	16
RD (M)	2½ yr.	4/16/51	14	185	51	1.68	3.96	15
Group 3								
BD§ (F)	4 mo.	11/10/50	11⅝	149	24	1.06	5.32	20
RD (F)	1 mo.	9/21/49	12 11/12	160	42	1.40	5.37	16
CC (M)	9 yr.	6/23/49	21½	180	34	1.38	6.02	14
GM (M)	16 yr.	6/21/49	21½	165	39.5	1.37	15.92	27
RF (M)	2 mo.	10/11/49	15½	182	57.5	1.76	11.87	11
Group 4								
FC (M)	8 mo.	5/25/50	17	178	64	1.80	12.82	16
PG (M)	6 mo.	5/16/49	16 11/12	170	55	1.62	11.95	13
RF§ (M)	10 mo.	5/26/50	16	186	68	1.91	8.64	10
DA (M)	9 mo.	5/24/50	19	193	69	1.98	9.42	14
WH (M)	10 mo.	6/23/49	17 9/12	178	61	1.75	9.10	14

*All measurements have been corrected to BTPS.
†Obtained under spontaneous breathing.
‡MBC = Maximum breathing capacity.
§Repeat observation on same person.

Results

Table 1 presents the values (BTPS) obtained for the pulmonary compartments and the voluntary maximum breathing capacity, with other pertinent data. The expected values for vital capacity and maximum breathing capacity have been obtained from our own standards[8] for the younger persons (sixteen years or less), and in the older patients the regression equations of Baldwin and his co-workers[9] have been used.

Table 2 presents the mean values and the standard deviations for the observed pulmonary compartments for each of the four groups as per cent of observed total lung capacity. The results are shown graphically in Figure 1. Most striking are the small magnitude of the vital capacity and the almost complete absence of expiratory reserve in the severest cases (Group 1). Proportionate increases in expiratory reserve, inspiratory reserve and vital capacity in the less severe cases were consistent with the clinical evaluation of pulmonary disability.

Since the fraction of observed total capacity occupied by the residual volume was so high, notably in Group 1, the question arose whether these patients had emphysema with a resulting shift in their end-expiratory resting position; that is,

were they breathing at a higher midposition? This would imply an expanded chest rather than a "collapsed" one. In an effort to evaluate this problem, this basis the expected residual volume would be 25 per cent of the total capacity. This value for residual volume was selected to represent an ex-

TABLE 1 (*Concluded*).

NAME	TIDAL† VOLUME	INSPIRATORY† RESERVE VOLUME	EXPIRATORY† RESERVE VOLUME	VITAL† CAPACITY	VITAL CAPACITY EXPECTED	RESIDUAL VOLUME	RESIDUAL VOLUME % OBSERVED TOTAL CAPACITY	MBC†‡ OBSERVED	MBC EXPECTED
	L.	*L.*	*L.*	*L.*	*L.*	*L.*	*%*	*LPM*	*LPM*
Group 1									
DF (M)	0.18	0.44	0.00	0.62	1.20	0.62	50.0	21	43
AM (F)	0.19	0.03	0.00	0.22	2.40	1.40	87.1	6	65
RC (M)	0.15	0.12	0.00	0.27	2.50	1.73	86.5	12	68
WL (M)	0.16	0.28	0.00	0.44	1.90	1.16	72.5	—	—
HH (M)	0.44	0.23	0.22	0.89	4.51	3.27	78.6	—	—
PO (M)	0.54	0.42	0.12	1.08	4.70	3.41	75.6	32	142
AM (M)	0.28	0.18	0.00	0.46	4.15	2.14	82.2	23	113
DM (F)	0.27	0.05	0.00	0.32	3.42	1.56	83.0	19	94
CH (F)	0.14	0.09	0.00	0.23	3.49	1.63	87.7	9	92
LA (M)	0.27	0.25	0.00	0.52	4.50	2.47	82.6	16	121
IT (M)	0.10	0.11	0.00	0.21	1.59	1.10	84.0	12	49
PG (F)	0.25	0.02	0.02	0.29	3.03	1.75	85.6	11	84
AM§ (M)	0.26	0.22	0.09	0.57	4.15	1.99	77.7	18	111
DM§ (F)	0.23	0.13	0.00	0.36	3.42	1.94	84.4	11	94
CH§ (F)	0.28	0.00	0.02	0.30	3.49	2.09	87.4	23	92
PG§ (F)	0.22	0.05	0.09	0.36	3.30	1.63	81.9	43	85
JT§ (M)	0.12	0.10	0.03	0.25	1.59	1.42	85.1	7	49
LA§ (M)	0.29	0.15	0.02	0.46	4.50	3.02	86.8	9	121
JK (M)	0.23	0.00	0.00	0.23	4.25	2.83	92.5	—	—
Group 2									
DS (M)	0.31	0.21	0.02	0.54	1.53	0.82	60.3	17	48
BD (F)	0.34	0.42	0.09	0.85	1.93	0.91	51.7	—	—
WL§ (M)	0.39	0.52	0.09	1.00	1.83	1.13	53.1	19	60
SR (F)	0.25	0.54	0.29	1.08	2.15	1.03	48.9	41	65
SH (F)	0.29	0.41	0.04	0.75	3.16	1.78	70.4	20	88
BK (F)	0.49	0.65	0.32	1.46	3.03	2.10	59.0	31	102
RE (F)	0.45	1.08	0.45	1.98	3.33	1.70	46.2	32	85
PO§ (M)	0.46	1.37	0.41	2.24	4.77	2.94	56.7	68	130
ND (M)	0.36	0.52	0.21	1.09	4.48	1.60	59.5	39	126
KM (M)	0.32	0.31	0.16	0.79	3.93	3.00	79.2	16	105
ND§ (M)	0.33	0.55	0.23	1.11	4.48	2.05	64.9	25	126
RD (M)	0.26	0.35	0.07	0.68	4.85	2.03	74.9	23	133
Group 3									
BD§ (F)	0.27	1.15	0.12	1.54	1.99	0.86	35.8	46	63
RD (F)	0.68	0.99	0.27	1.94	2.62	1.18	37.8	48	75
CC (M)	0.43	1.08	0.22	1.73	4.54	1.84	51.5	58	104
GM (M)	0.59	1.56	0.49	2.64	4.20	1.70	39.2	127	103
RF (M)	1.08	1.51	1.30	3.89	4.71	1.94	33.3	57	134
Group 4									
FC (M)	0.80	1.44	0.82	3.06	4.58	2.01	39.6	37	140
PG (M)	0.92	1.38	1.13	3.43	4.32	1.90	35.6	133	127
RF§ (M)	0.86	2.49	1.92	5.28	4.81	1.12	17.5	118	145
DA (M)	0.67	2.79	0.64	4.10	4.93	2.75	40.3	56	152
WH (M)	0.65	3.02	0.43	4.10	4.55	2.10	33.9	130	136

the pulmonary compartments as observed were recalculated in terms of an expected or predicted normal total lung capacity. The predicted total pected average value for all patients studied and is not quite correct for either the youngest or the oldest patients. When the observed values for the

TABLE 2. *Mean Pulmonary Subdivisions as Percentage of Observed Total Lung Capacity.*

	NO. IN GROUP		VC %	IRV %	TV %	ERV %	RV %
Group 1	19	Mean	18.3	7.1	10.2	1.0	81.7
		S. D.*	±8.7	±7.8	±2.2	±1.6	±8.8
Group 2	12	Mean	41.4	20.7	14.0	6.6	58.6
		S. D.	±11.3	±6.5	±4.7	±3.7	±11.3
Group 3	5	Mean	60.5	29.8	15.4	15.3	39.5
		S. D.	±6.2	±12.9	±4.1	±10.2	±6.3
Group 4	5	Mean	66.6	36.5	13.4	16.7	33.4
		S. D.	±8.3	±8.4	±2.7	±8.3	±8.3
Normal mean			75	40	14	21	25
Estimated S. D. . .			±6	±6	±2	±6	±6

*Standard deviation.

capacity was calculated from the predicted vital capacity by assuming that the vital capacity should be 75 per cent of the expected total capacity; on patients of each group are plotted on such a base line (Fig. 2), those in Group 1 appear to be breathing at virtually the same mid-position as the other

groups; that is, there has been no shift on the lung-volume scale toward either collapse or emphysema. Table 3 presents the means and the standard deviations of the four groups when calculated on the basis of percentage of expected total capacity. The same trend is apparent. Relatively, the vital capacity increases and the residual volume decreases from Group 1 to Group 4. Meanwhile, the total lung capacity increases toward more nearly normal values, and there is little change in the functional residual volume (residual volume plus expiratory reserve volume). Under these conditions the increase in total lung capacity has been due to an increase in the inspiratory-reserve volume rather than any shift in the end-expiratory position or the functional residual volume.

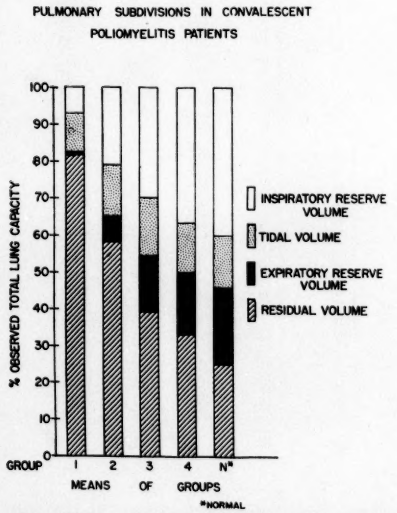

FIGURE 1. *Mean Values and Standard Deviations for Observed Pulmonary Compartments According to Percentage of Observed Total Lung Capacity.*

The voluntary maximum breathing capacities have been calculated as percentage of the expected values, and the means and standard deviations for the various groups are presented in Table 4. Not all patients in Group 1 were able to perform the test. If these patients were included as zero, the mean value would be even lower. Here again the trend toward normal values is apparent, with both Group 3 and Group 4 having mean values of 71 per cent and 79 per cent respectively. The relatively low value in Group 4 may reflect the effect of prolonged bed rest on this test.

Discussion

The upper limit of the functional residual volume is determined by the resting end-expiratory position. The resting end-expiratory position in quiet breathing is determined by two opposing forces, the tendency of the lungs to collapse and the tendency of the chest wall to expand. The latter tendency is the sum of forces involving the conformation of the chest wall, the action of gravity and other factors. The end-expiratory position may be altered by factors such as rapid breathing and airway obstruction, situations in which the duration of expiration is insufficient for an equilibrium point to be reached. If the forces involved in the balance mentioned above have been unaffected by poliomyelitis, there will be no change in the midposition or the resting end-expiratory position. Since the end-expiratory positions in these patients were in the normal range, even though they had had markedly reduced expiratory or inspiratory reserves, it can be concluded that the respiratory-muscle paralysis did not affect the elastic properties of either the chest wall or the lung in such a way as to alter the end-

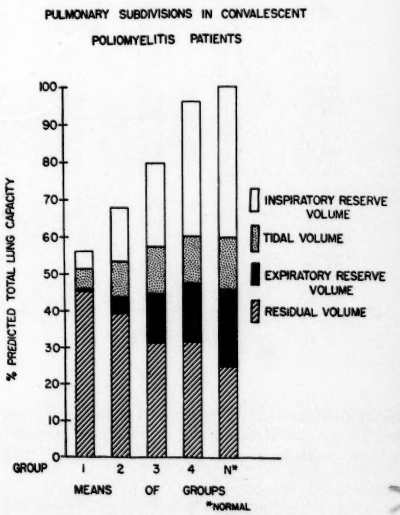

FIGURE 2. *Mean Values and Standard Deviations for Observed Pulmonary Compartments According to Percentage of Predicted Total Lung Capacity.*

expiratory position. However, it should be emphasized that this does not mean that the distensibility of the chest wall and lung may not be altered. Since most of the patients in Group 1 and many in Group 2 had used a tank or chest respirator for long periods of time (one to two years), it appears that the use of the tank or chest respirator did not produce any deleterious effect on those properties of the lungs and chest that determine the resting end-expiratory position. In regard to the other factors that may functionally affect the lung-volume subdivisions, it was 53 per cent of the observed total capacity. No mention was made of the volume of the other pulmonary subdivisions, so it is not possible to determine the functional residual volume or to evaluate this observation in the light of the present discussion.

In a number of cases it was possible to obtain repeated determinations. During this period some patients had improved clinically and were placed in a higher group. Others showed virtually no improvement and remained in the same classification.

TABLE 3. *Mean Pulmonary Subdivision as Percentage of Predicted Total Lung Capacity.*

	No.		VC	IRV	TV	ERV	RV	TC
			%	%	%	%	%	%
Group 1	19	Mean	10.8	4.5	5.7	0.6	45.4	56.2
		S. D.*	±7.5	±5.8	±1.8	±1.0	±7.7	±11.3
Group 2	12	Mean	28.7	14.4	9.6	4.7	39.2	67.9
		S. D.	±11.0	±6.2	±3.8	±3.0	±9.2	±14.0
Group 3	5	Mean	48.2	22.2	12.8	13.2	31.6	79.8
		S. D.	±11.6	±11.8	±4.6	±9.7	±1.3	±13.9
Group 4	5	Mean	64.2	35.7	12.7	15.8	31.9	96.1
		S. D.	±11.3	±10.3	±2.1	±7.9	±7.9	±7.6
Normal mean			75	40	14	21	25	100
Estimated S. D.			±6	±6	±2	±6	±6	±12

*Standard deviation.

was evident that the expiratory fraction of the respiratory cycle was sufficiently long for the lungs and chest wall to reach their usual point of balance.

Previous reports of emphysema[4-6] have been derived from post-mortem observations on patients who died during the acute stage of the disease. The reported emphysema may represent areas of compensatory emphysema, since areas of atelectasis were described also. Furthermore, in the presence of pneumonia, which many of the patients had, bronchial obstruction may have played a prominent part in the production of the emphysema. Many of the patients had the bulbar type of poliomyelitis, and the aspiration of secretions may also have been an important factor. In addition, emphysema has been reported at autopsy in patients who had not been treated in a tank or chest respirator. This finding casts considerable doubt on the hypothesis that respirator treatment is responsible for the development of emphysema in poliomyelitis patients.

Only one report of a residual-air determination has been found.[3] In this case the residual volume

TABLE 4. *Voluntary Maximum Breathing Capacity as Percentage of Expected Capacity.*

	No. in Group	Mean	Standard Deviation
		%	%
Group 1	19	20.3	±12.3
Group 2	12	35.1	±16.2
Group 3	5	71.6	±27.0
Group 4	5	79.0	±33.1

The objective measurements of the pulmonary subdivisions confirmed these clinical evaluations. However, in 3 out of 9 who had repeated maximum-breathing-capacity measurements, there was a decline. The reasons for this are not evident.

SUMMARY

The pulmonary subdivisions and maximum breathing capacity of patients with respiratory-muscle paralysis convalescing from poliomyelitis are presented. It is shown that there is no significant change in the resting end-expiratory position of these patients; that is, that neither collapse of the chest nor generalized emphysema results from either the disease or the prolonged use of a tank or chest respirator.

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IRRADIATION OF THE NASOPHARYNX IN CHILDREN WITH INFECTIOUS ASTHMA*

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BOSTON

THE therapeutic effect of irradiation in allergic diseases, principally asthma, has been the subject of investigation and discussion since 1906, when Schilling, as reported by MacInnis,[1] observed that asthmatic patients were frequently relieved after fluoroscopy. Other reports appeared from time to time, but Maytum[2] studied it thoroughly in 1939, reporting some 215 cases treated by irradiation over the mediastinum in whom the effect was found to be only temporary in any case and, in 47 per cent of those observed, a complete failure. In 1945, a study made by Army Air Force Surgeons[3] of several thousand children and adults with hearing difficulties who were treated by irradiation of the nasopharynx revealed a significant reduction in the frequency of common colds after such therapy.

It remained for Gay[4] to make the first report, in 1946, of the effect on asthma in children brought about by irradiation of the nasopharyngeal lymphoid tissue with radon. This was prompted by a chance observation on deaf children made by Crowe and Ward in 1943 and was followed in 1947 by a more complete study of the effect of radon irradiation in a group of 34 asthmatic children by Ward, Livingston and Moffat.[5] Their observations revealed 44 per cent with complete relief from asthmatic attacks and 24 per cent with partial relief, making a total of 68 per cent who were 50 per cent or more improved. Spain and Weymuller[6] studied 43 asthmatic children after irradiation of the nasopharynx by radium and found 20 per cent completely relieved, 57 per cent partially relieved and 23 per cent with unsatisfactory results. Cohen and Fisher[7] published the results in 15 asthmatic children treated with radium applications to the nasopharynx, finding improvement for seventeen weeks, but after twenty-six weeks the patient's condition became worse than it had been prior to radiation.

We have been studying irradiation of the nasopharynx in asthmatic children since shortly after Gay's original report[4] was published in 1946. A total of 41 children have been so treated. Results have been observed for periods of six months to four years, with 85 per cent of the patients followed for two years or more.

These patients were carefully selected by the allergist and the otolaryngologist, using the following criteria: a history of severe asthma of over two years' duration associated with respiratory infections (one patient, aged one and a half, was an obvious exception to this rule); failure to obtain satisfactory results with other methods of treatment for infectious asthma; control or stabilization by allergic treatment and management of any accompanying asthma due to other allergens; and the finding of hypertrophied lymphoid tissue in the nasopharynx, or evidence of infection, or both. We believe that by this method of selection the therapy was subjected to an exacting test.

A complete medical history was taken and a complete physical examination was made in each case, as well as a history of allergy, a complete ear, nose and throat examination, including nasopharyngoscopy, complete blood counts, tuberculin and Hinton tests, chest and sinus x-ray films (at least once) and, in many cases, nose and throat cultures. Before irradiation each patient had at least two basal sedimentation rates, two nasal smears after the method of Hansel and two white-cell counts, with differential studies of stained smears. After irradiation these studies were repeated at frequent intervals. Whenever possible the studies were made both when the patient had asthma and when no asthma was present.

Severity of the asthma and results of the treatment were scored in the following manner:

Grade 4: Constant asthma day and night with frequent respiratory infections always accompanied by attacks of greater intensity.

Grade 3: Asthma part of almost every day with frequent respiratory infections, always accompanied by attacks of greater intensity.

Grade 2: Frequent respiratory infections, always accompanied by asthma.

Grade 1: Occasional asthma with respiratory infections but not with every respiratory infection.

Grade 0: All respiratory infections without asthma.

The history was carefully recorded at each visit by the same person in all cases, to determine the patient's response. This was the most difficult part of the study and obviously is the variable most open to question, particularly when a mother saw so much improvement in a patient progressing from Grade 4 to Grade 2 that she was inclined to believe at the latter point that the patient was having no trouble at all. However, it was thought that this method was the best available and that by perseverance we obtained a reasonably accurate assessment of the patient's condition.

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Treatment consisted in the direct application of radium salt, in the standard 50-mg. Monel-metal applicator, to each side of the nasopharynx in a series of 26 children. Another series of 15 children were treated by roentgen radiation. In the radium-treated group each patient received a series of three applications, from one to four weeks apart, each application being of 100 mg. for eight to ten minutes. In 8 of these patients a second series of three applications was given from six to twenty-four months later, but in no case was a second series given before twelve months, if the initial series was given for more than eight minutes per treatment. In the group treated with x-rays, each received a series of two treatments varying from one to three weeks apart with 100 r for eight to ten minutes. In 1 of these patients a second series was given nine months later. Untoward effects from the radium treatments were minimal and consisted of some local discomfort at the time and slight increase in nasal stuffiness for twelve to twenty-four hours. It required cooperation from the patient and was not feasible in those under five years of age, but it had the advantage of combining the treatment with frequent examinations by the otolaryngologist. Reaction to x-ray treatment consisted of occasional swelling and soreness of the parotid glands for twenty-four to forty-eight hours. In conjunction with sedation, it could be used in any group.

Since there was no marked difference in results between the patients treated with radium and those treated with x-rays, they have been combined in one group for analysis. Twenty-six (or 63 per cent) were males and fifteen (or 37 per cent) were females. This compares with the figures of Ward, Livingston and Moffat,[5] who reported 74 per cent males and 26 per cent females in their series of 34 cases. Ages at the start of treatment varied from one and a half to eleven years, with an average age of seven years. The average age of onset of asthma was 3.8 years. The duration of asthma prior to treatment ranged from two to ten years, with an average of 3.3 years. There were 9 children (or 22 per cent) whose asthma was rated as Grade 4 before treatment, 23 (or 56 per cent) rated as Grade 3 and 9 (or 22 per cent) rated as Grade 2. A family history of allergy was elicited in 30 patients (or 73 per cent). Again, this compares closely with a family history of allergy in 70 per cent of the patients studied by Ward and his co-workers.[5] Twenty-five of the patients (or 61 per cent) had had tonsillectomy and adenoidectomy prior to treatment. With the exception of 1 girl, all patients had undergone tonsillectomy and adenoidectomy at least one year prior to this treatment. The average age at which tonsillectomy and adenoidectomy was performed was 4.4 years. Fifteen patients, or slightly more than half of those having tonsillectomy and adenoidectomy, reported temporary improvement after the operation. The remainder reported no benefit from it.

Sensitivity to other allergens such as pollens, animal emanations, molds, dust and foods, evidenced by positive scratch and intradermal tests with clinical confirmation by symptoms, was present in 38 children (or 92 per cent). Hyposensitization treatment to one or more of these allergens was received by 31 patients (or 76 per cent). In fourteen of these patients increased benefit from this treatment was evident after irradiation. Roentgenographic evidence of sinus involvement was found in 11 children (or 26 per cent). This varied from thickening of the mucous membrane to complete haziness. Roentgenographic evidence of active pulmonary infection was found in 8 patients (or 20 per cent). This did not include emphysema or increased hilar markings, which were not considered evidence of infection. Hypertrophied lymphoid tissue in the nasopharynx with or without purulent secretions was present in all cases before treatment.

Results

Of the entire group of 41 patients, 11 (or 27 per cent) obtained complete relief for periods from two to four years. One of these had a recurrence of moderate asthma with several respiratory infections after two years. He received another series of radium treatments at this time and has since been symptom free.

Seventeen patients (or 41 per cent) obtained excellent results for periods of eighteen months to four years. These patients are classified as having Grade 1 asthma. In 2 cases there was a relapse at nine to twelve months to Grade 2. One of these had a second series of radium treatments and the other a second series of x-ray treatments. Both have returned to a Grade 1 status. In 1 case there was a relapse at twenty-four months to Grade 2. After a second series of radium treatments he has now been completely relieved for twenty-two months.

Five patients (or 12 per cent) obtained only a fair result in our opinion, although in each case the parent considered the treatment satisfactory. Three of these patients went from Grade 2 to Grade 1, an improvement of approximately 50 per cent; 1 patient went from Grade 3 to Grade 2; and the other patient progressed from Grade 4 to Grade 2.

In 8 patients (or 20 per cent) the results were unsatisfactory. All these patients had asthma of Grade 4 and 3 severity. In several cases there was a change from Grade 4 to Grade 3. This was not regarded as improvement but as a probable variation in the natural history of the disease. The 5 patients who obtained only fair results might be included in this category, but since both the parents and the physician were convinced of the improvement, they were recorded as having derived benefit from the treatment. It is interesting at this point of record for speculation that 1 patient with asthma of Grade 3 severity for two years who had derived no benefit whatever for one year after irradiation

then had a severe case of pertussis that was treated with hyperimmune human pertussis serum. From the onset of the spasmodic cough to the present, a period of eighteen months, he has not wheezed at all.

Discussion

From this and previous studies by others, it seems that irradiation of the nasopharynx in children who have asthma associated with respiratory infections is a valuable therapeutic adjunct.

Most of these children were listless, underweight and anorexic. Some were chronic invalids. In a number of cases the changes following irradiation were remarkable, and not only did the above symptoms disappear but the patient's mental attitude was tremendously improved. The following case is an example.

Case Report

M. C., a 6-year-old boy, had had asthma with respiratory infections from the age of 1 year; at the time of treatment his asthma was graded 4. He weighed 36 lb. and was pale and listless. He was unable to attend school and wheezed constantly; this increased markedly with any exertion. His condition was especially severe from the middle of August until frost. This had been moderately improved by ragweed hyposensitization carried out in the previous year. A mixed respiratory vaccine had been of no value. His acute attacks with respiratory infections were not well controlled with penicillin or chemotherapy. A tonsillectomy and adenoidectomy performed 2 years previously had been followed by improvement for 3 months, after which he had relapsed to his former status. Sinus and chest x-ray films were clear except for emphysema. Nasopharyngoscopy revealed hypertrophied lymphoid tissue, particularly around the eustachian orifices. He was given three radium treatments; three months after the last treatment his asthma was graded 1. Six months later he was alert and active, attending school and playing normally with other children. His asthma was graded 0. At the end of 1 year he weighed 58 lb. and, according to the mother's report, was "a different child." He had an excellent result that year from ragweed inoculations during the pollen season. After 2 years there was a slight return of asthma to Grade 1, and he received another series of radium treatments. Since that time his asthma has been graded 0, and he has been seen only at 6-month intervals. It is now 4 years since his first irradiation; he is a healthy and active 10-year-old boy.

The mechanism that affords relief in these patients is not understood, but after irradiation the lymphoid follicles decrease in size, thereby decreasing the depth of the crypts; foci of chronic or recurring infection are thus probably eliminated. Other factors that may play a part are the lessening of secretions, the reduction of mechanical obstruction and changes in the bacterial flora. Another idea advanced by some workers is the possibility that irradiation changes tissue locally, in a manner that might increase the threshold of absorption for allergens. Since the nasopharynx is a very small part of the total surface area of the respiratory tract, it seems that Spain and Weymuller[6] were on firmer ground when they observed that "a reduction in symptoms by lessening the allergic absorptive activity of the comparatively small area of the nasopharyngeal mucosa does not seem likely."

That partial or complete relief was obtained in 80 per cent of those treated may seem a high percentage of good results, but this compares closely with the 77 per cent good results in the series of 43 patients similarly treated by Spain and Weymuller.[6] These results are better than the 68 per cent reported improved by Ward and his co-workers,[5] but it must be borne in mind that in Ward's series only 80 per cent of the patients had asthma with each respiratory infection, whereas in Spain's cases and in ours, all the patients were selected because respiratory infection was a factor in their asthma. It seems evident that results of irradiation are chiefly dependent on the reduction in frequency and severity of respiratory infections; therefore one would expect better results in such a group.

In the 15 patients whose response to hyposensitization treatment with other allergens improved after irradiation, a reasonable explanation might be based on the lessening of secretions, reduction in mechanical obstruction and removal of the infection that had acted as a possible trigger mechanism for the precipitation of symptoms from other allergens. This could explain Ward's[5] report of 5 patients with asthma due to extrinsic factors who were benefited after irradiation as much as those with infection.

The low incidence of positive x-ray findings in chest and sinuses does not seem consistent with figures from previous studies of the frequency of sinusitis in asthmatic patients, which range from 50 per cent to 75 per cent.[8-10] However, of the 11 patients with x-ray evidence of sinusitis, 9 obtained an excellent result. Cohen and Fisher[7] stated, reporting on their small series of 15 patients, that they found generally better results in patients with normal sinuses. Although some of our patients had partial relapse at varying intervals, we did not find a tendency to revert to the original status in the seventeenth to twenty-first week, which was reported by Cohen and Fisher.[7]

Although tonsillectomy and adenoidectomy did not seem permanently to benefit these patients, we do not wish to imply that this operation should be avoided in asthmatic children. It must be kept in mind that ours is a selected group of patients who had done poorly under all types of treatment. All had hypertrophied lymphoid tissue in the nasopharynx, and all had a reduction or disappearance of this hypertrophied tissue after treatment. Since the 8 patients with unsatisfactory results had just as much reduction in the lymphoid tissue as those patients who did well, the amount of residual lymphoid tissue cannot be used as a criterion of expected benefit from this treatment.

Extensive laboratory studies have been made on these patients and will be reported at a later date.

Summary

Forty-one children with asthma of over two years' duration associated with respiratory infection were treated by x-ray or radium irradiation of the

nasopharynx. Sixty-three per cent were male and 37 per cent were females.

These children were strongly allergic, as evidenced by a family history of allergy in 73 per cent and by other allergic manifestations, on the basis of skin tests and symptoms, in 92 per cent.

Improvement for observed periods from six months to four years was noted in 80 per cent of those treated, with no particular tendency to recurrence. Good results are chiefly dependent on reduction in frequency and severity of respiratory infections. No explanation was found for the failures of treatment.

Conclusions

Irradiation therapy is a valuable and effective treatment in selected cases of asthma in children in whom some or all attacks are precipitated by respiratory infections.

Direct application of radium to the nasopharynx and x-ray radiation appear to be equally effective.

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THE SIGNIFICANCE OF PLEURAL EFFUSION IN PATIENTS PAST THE AGE OF FIFTY*

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In recent years the differential diagnosis of pleural effusion has assumed great importance. Newer methods of cytologic examination have permitted more exact diagnosis.[1, 2] Little attention has been paid to the importance of age in the differential diagnosis, however; although some observers have studied groups of cases of pleural effusion from the standpoint of etiology, few have emphasized age factors.

Tuberculosis has been implicated as the commonest cause of pleural effusion in all age groups.[3] Similar views have been expressed by Ormond,[4] whose cases were reported from a tuberculosis sanatorium. Skatvedt[5] specifically studied patients over forty years of age; he concludes that tuberculosis is the most frequent cause of effusion, with carcinoma next in importance.

More recently other investigators have reported carcinoma as the most frequent cause in the older age groups. Chisholm[6] has noted that cancer should rank high in the differential diagnosis of effusion in adults. Durant and Rodgers[7] suggest that effusions in older patients are frequently the result of pulmonary carcinoma. Engelhardt and Wilson,[8] in a study of 148 cases, found that tuberculosis and pneumonia predominated below the age of forty whereas heart disease and cancer were more common after forty. Although Tinney and Olsen[9] found carcinoma the most frequent cause of effusion in 274 cases, the age factor was not reported.

In order to study the causes of effusion in an older age population, 103 patients with pleural effusion past the age of fifty admitted to the Beth-El Hospital and Jewish Sanitarium and Hospital for Chronic Diseases were analyzed. These institutions do not admit known cases of tuberculosis.

The presence of effusion was established by thoracentesis, clear-cut radiologic evidence or postmortem examination.

Material and Method

In the group of 103 cases, the age of the patients ranged between fifty and eighty-seven years. Sixty of the 103 patients were women and 43 were men (Table 1). The final diagnosis was established by means of thoracentesis, bronchoscopy or lymph-node biopsy, post-mortem examination or presumptive evidence. In 70 cases the diagnosis was proved by the first three methods; in 33 cases a presumptive final diagnosis was made. Sixty-four thoracenteses were performed in 59 patients. In 21 cases a biopsy was taken. Fourteen cases were autopsied. In some cases more than one of the above diagnostic procedures were employed.

Etiology

The etiologic factors responsible for the production of pleural fluid in the 103 cases are listed in Table 2. Carcinoma was found in 45 cases (43 per cent) and congestive heart failure in 36 cases (35 per cent). Tuberculosis was encountered in only 1

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case. The diagnosis was established by means of guinea-pig inoculation and culture of the fluid from both pleural spaces.

The type of effusion most frequently encountered was a serous unilateral exudate. Hemorrhagic fluid was found in 14 cases. Ten of these were associated with neoplastic disease; in all these cases malignant cells were found in the pleural fluid. In the other 4 cases the clinical history and course of illness readily accounted for the finding of hemorrhagic fluid. No case of congestive failure showed hemorrhagic fluid. Carcinoma cells were also found in 5 cases of serous effusion. Averaging 64 patients in whom thoracenteses was performed, 15 cases showed malignant cells (23 per cent). When compared to the total number of cases associated with carcinoma (45), malignant cells were found in 33 per cent of the latter. Only 18 cases of bilateral effusion were found. The commonest cause of bilateral effusion was congestive heart failure. Only 1 case of purulent effusion was noted.

Where pleural effusion was due to neoplasm, intrathoracic tumor and carcinoma of the breast were most frequent (Table 3). Of a total of 45 patients with carcinoma, 25 (57 per cent) had bronchogenic carcinoma and 9 had carcinoma of the breast.

TABLE 1. *Age and Sex Distribution.*

AGE	CASES	SEX	
		MALE	FEMALE
50–59	35	13	22
60–69	40	21	19
70–79	20	7	13
80–89	8	2	6
Totals	103	43	60

TABLE 2. *Etiology of Pleural Fluid in 103 Cases.*

ETIOLOGY	TOTAL CASES	CHARACTER		LOCATION	
		SEROUS FLUID TOTAL CASES	HEMORRHAGIC FLUID TOTAL CASES	UNILATERAL CASES	BILATERAL CASES
Carcinoma	45	24	10	42	3
Congestive failure	36	13		24	12
Pulmonary infarct	2		2	1	1
Lymphoblastoma	2	2		2	
Pneumonia	7	1		7	
Tuberculosis	1	1			1
Cirrhosis of liver	1	1		1	
Nephrosis	1				1
Miscellaneous					
Subphrenic abscess	1	1		1	
Trauma	2		2	2	
Hepatitis	2	1		2	
Bronchiectasis	2			2	
Empyema	1	1		1	
Totals	103	45	14	85	18

TABLE 3. *Pleural Effusion Associated with Primary Neoplasm: 45 Cases.*

SITE	NO. OF CASES
Intrathoracic	
Bronchogenic	25
Mesothelioma	1
Breast	9
Ovary	1
Kidney	1
Stomach	0
Colon	3
Prostate	0
Esophagus	1
Thyroid	0
Jejunum	0
1° site not established	4
Total	45

COMMENT

We have found a high incidence of neoplastic lesions (43 per cent) as a cause of pleural effusion in persons over the age of fifty and a low incidence of tuberculosis or other inflammatory lesions. Congestive heart failure was also a prominent cause in the same age group (35 per cent). In this study our findings indicate that 78 per cent of pleural effusions in persons past the age of fifty could be ascribed to carcinoma and congestive heart failure. Furthermore, the finding of hemorrhagic fluid in the pleural cavity in this age group strongly indicates the presence of neoplastic disease.

CONCLUSION

Carcinoma and congestive heart failure are the most frequent causes of pleural effusion in persons past fifty studied in these institutions.

Where other causes such as trauma and infarction could be excluded, the presence of hemorrhagic fluid was invariably associated with neoplastic disease.

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POSTVACCINAL ENCEPHALITIS WITH PRE-EXISTING FOCAL CEREBRAL SEIZURES*

Report of a Case

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THE occasional incidence of acute encephalitis following vaccination against smallpox may be as old as the procedure itself. Ranque, a French physician writing in 1801 (cited by Gorter[1]), mentioned fever, convulsions and coma as a sequel to vaccination. It was more than a century before sporadic cases began to be noted in the literature.[2, 3] Lucksch,[3] in 1924, described the pathological findings in 3 cases in children. Though he erred in holding the pathological picture to be identical with that of encephalitis lethargica, his report served to focus attention on the disease. The excellent report of Turnbull and McIntosh[3] established it as a clinical and pathological entity.

Its incidence in Europe has lately been summarized.[4] The frequency ranged from 1 case in 4000 vaccinations in Holland (1924–1926) to 1 in 300,000 in Switzerland (1921–1926). Newman[5] collected 74 cases in the United States from 1922–1933; 5 more appeared in subsequent reports.[6-9] Weinstein[10] reported 46 possible cases in New York City during the mass vaccination of 1947, but of 8 cases in which autopsies were done, none had the classical lesions. If the remaining 38 be allowed, the total, together with the case here presented, is 118. The complication occurs most frequently in children over one year of age and after primary vaccinations.

The clinical course of the disease is often dramatic. Onset usually occurs ten to twelve days after vaccination, but extremes of one to thirty-two days have been noted. Initial malaise, headache, irritability, nausea and vomiting are followed shortly by fever ranging to 108°F., nuchal rigidity, minor or major seizures and depression of consciousness in varying degrees to deep coma. Neck retraction or opisthotonos, rigidity and paralysis of the extremities are common. The third, fourth, sixth, seventh, ninth and tenth cranial nerves appear to suffer most. Spinal-cord symptoms predominate in about 10 per cent of the cases. The spinal fluid is under normal or increased pressure and may evidence some increase in total protein and a mild lymphocytic pleocytosis. Death or recovery occurs within one to two weeks. Although the mortality rate is as high as 42 per cent,[11] and severe neurological residuals such as paraplegia and mental deterioration are sometimes seen, recovery in the remaining cases is usually remarkably good.

The pathologic changes are those of an acute encephalomyelitis.[3, 12, 13] In the acute stage there is congestion of cortical and leptomeningeal vessels with small hemorrhagic areas and at times cerebral swelling and myelomalacia. On microscopical examination there is seen adventitious vascular and perivascular parenchymal infiltration by lymphocytes, plasma cells and a few polymorphonuclear leukocytes throughout the cerebrospinal axis. Perivascular demyelination with associated macrophage infiltration and gliosis are characteristic features. Neuronal changes include tigrolysis, nuclear eccentricity and some neurolysis. Gray matter is more severely affected than white. Cortex, basal ganglia (especially the substantia nigra), cranial-nerve nuclei, visual pathways and lumbar cord are most severely damaged.

Etiologic agents that have been considered are the vaccine virus, activation of a second "latent" virus in the central nervous system by the vaccine virus and an antigen-antibody reaction initiated by the vaccine. Recent experimental production of acute disseminated encephalomyelitis in animals[14-18] strongly supports the last. The clinical and pathologic similarities between postvaccinal and postinfectious encephalitis are also consonant with this view.[19]

The unique clinical features and the scarcity of electroencephalographic studies on postvaccinal encephalitis prompt the following report.

CASE REPORT

B. J. M., a 7-year-old girl, a first-born child, was admitted to the Neurosurgical Service of Emory University Hospital on November 14, 1950. Ten weeks before admission she was vaccinated against smallpox. One week later there was rapid onset of fever to 107°F. with unconsciousness accompanied by two seizures that began in the left side of the face and spread to the left hand, forearm, arm and leg before becoming generalized. She was admitted to the Columbus City Hospital on September 3, 1950. She was unresponsive and doubly incontinent; she lay with her neck retracted and the lower and left upper extremities extended. The right upper extremity was flexed. Urinalysis and complete blood count were normal. Lumbar puncture yielded clear, colorless fluid under increased pressure. It contained 1 lymphocyte, 1 polymorphonuclear leukocyte and 47 mg. protein per 100 cc. Culture of this fluid and of blood yielded no organisms. Her course was febrile and stormy during the next two weeks, after which her fever began to subside. Tube feeding was necessary. The spinal fluid on September 6, 1950, contained 2 white cells and 13 mg. per cent protein. The culture was again negative. On October 4, 1950, the spinal fluid contained 1 lymphocyte, 73 mg. protein, 70 mg. sugar and 600 mg. chlorides per 100 cc. Culture again was negative. Her neurologic status remained virtually unchanged until her discharge on October 11, 1950.

She had been born at full term after a precipitous 45-minute labor. Her development had appeared normal until the age of 8 months, when she had her first focal seizure, which involved her left face, hand, arm and leg before becoming generalized, with unconsciousness, chewing and salivation. At 11 months she had "acute bronchitis." At 1 year her seizures recurred intermittently for 4 hours. Thereafter she was confused and had a postictal left hemiplegia for 36 hours. Similar

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attacks occurred about once a year. Minor attacks, characterized by staring, absence, chewing, urinary incontinence and tonic flexion of the upper extremities, occurred once or twice a month. Between attacks she was fretful, and her left side was noted by the parents to be somewhat weak. Because of the seizures, she was seen at the age of 3 years as an outpatient on the Neurosurgical Service. The only positive physical finding at that time was a speech impediment. A diagnosis of cerebral birth palsy with focal seizures was made. Dilantin and phenobarbital therapy was instituted, but the regimen was not followed consistently, and her attacks continued undiminished. However, she was able to attend kindergarten and her general health was good.

At physical examination the temperature was 100°F., the pulse 100 and the respirations 14; the blood pressure was 120/70. The child was well developed, poorly nourished and extremely hirsute. When undisturbed she lay with the lower extremities and right upper extremity extended, the left upper extremity flexed, the neck retracted and the head turned to the right. Her mouth was open and she stared unseeingly with dilated, fixed pupils. She uttered animal-like cries at intervals. When she was disturbed by tactile, thermal or painful stimuli her posture became exaggerated, her cries became continuous and there were adversive movements of the head and eyes toward either side. There was marked

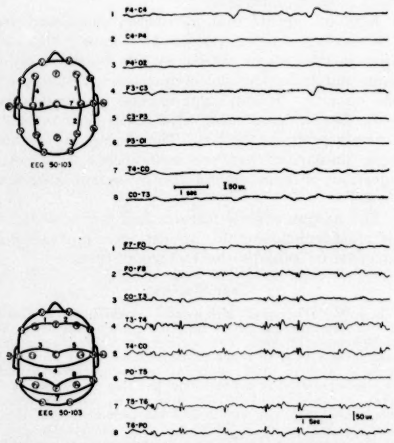

FIGURE 1. *Electroencephalograms Taken on November 16, 1950, in Seven-Year-Old Girl with Postvaccinal Encephalitis.*

rigidity of the neck, trunk and extremities. Deep tendon reflexes were ++ and equal, plantar responses were extensor and the abdominal reflexes were absent. The fundi were normal; corneal and gag reflexes were active. She started and attempted ineffectively to turn toward a loud sound. *Laboratory examination* revealed that the urine and blood were normal; a blood Kahn test was negative. X-ray films of the skull were within normal limits. Nutrition was maintained with tube feedings. There was no essential change in her condition. Two electroencephalograms (Fig. 1) taken on consecutive days were similar. There was remarkably little electrical activity in the "waking" state. No alpha appeared, but there was some very low-voltage (10 μv) 18-per-second beta activity that predominated in the central regions. Some random low-voltage 3-per-second waves appeared over the right hemisphere, maximum at the centrotemporal region (C4-T4) with some similar transmitted activity on the opposite side. In relaxation there were random sharp waves, spikes, spike-and-wave and multiple spike-and-wave complexes over the right inferior centrotemporal region (C4 and T4) with some similar transmission to the opposite side. They were enhanced after 0.05 gm. of Seconal was given by mouth. There was some low-voltage 5-6 and 8-per-second activity on Gastaut triangulation in the frontal, central and parietal planes that was maximal on the right side (F8, T4, T6). She was discharged unchanged on November 17, 1950. During the ensuing 6 months there was little change in her condition. She then gradually learned to take spoon feedings but licked and chewed excessively. Her posture changed only in that the right upper extremity became predominantly flexed like the left. No further seizures occurred. On September 13, 1951, she was readmitted to the hospital for study.

Physical examination revealed that she was poorly nourished but less hirsute than on the previous admission. Her posture

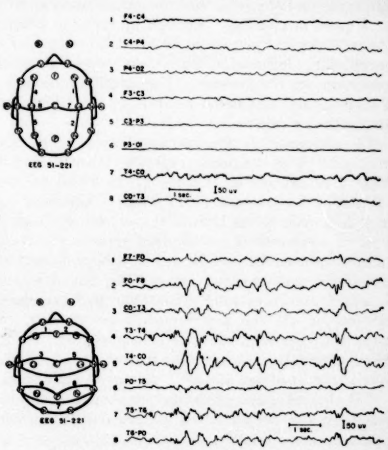

FIGURE 2. *Electroencephalograms in Same Patient, September 14, 1951.*

was decorticate: the neck was retracted, the upper extremities flexed and the lower extremities extended. When she was disturbed the posture became exaggerated, and she cried out, as before. Her mouth was open, and at times chewing movements were noted. The pupils were dilated; the right reacted to light and she blinked at threat on that side. There was pallor of both disks. Corneal and gag reflexes were active, and she started violently in response to handclap. The deep tendon reflexes were increased, the abdominal reflexes were absent and the plantar reflexes were extensor. There was predominant extensor rigidity in the lower extremities and flexor rigidity in the upper, but it was less pronounced than before. She was still doubly incontinent. When fed she gulped voraciously and licked and chewed excessively. An electroencephalogram taken on September 14, 1951 (Fig. 2) was similar to that made at the previous admission. The cortical acitivity was still markedly depressed, though of somewhat greater amplitude, when the child was maximally alert. Some 18-20/sec. low-voltage beta activity appeared over the central regions and at times over the frontal regions. Medium-voltage random and rhythmic 2-3/sec. waves occurred over the right centrotemporal region and were less prominent on the left. After the administration of 0.05 gm. of Seconal by mouth she was quiet, and there was a general increase in amplitude of all these frequencies. In addition random sharp waves and spikes began over the right frontocentrotemporal regions, and at times these became almost rhythmic at 1 per second. Gastaut triangulations in the

coronal plane yielded sharp wave and spike-phase reversals in the right temporal region (T4) and slightly less similar activity in the right inferior frontal region (F8). There was a consistent amplitude asymmetry, in that the voltages were higher over the right side. The epileptiform activity remained well localized though more prominent than in the previous records. She was discharged unchanged on September 15, 1951. On October 12, 1951, she had two seizures; these were similar to though less severe than those marking the onset of her illness.

Discussion

The clinical course of this patient's disease was dramatic in the acute stage and the residual neurologic deficits were profound. The diffuse nature of the encephalomyelitic process was indicated by the striking picture of decorticate rigidity, blindness and paralysis. Her cries on being disturbed by cutaneous or loud auditory stimuli were the only evidence of consciousness.

The clinical findings were reflected in the almost complete absence of cortical electrical activity. The Gastaut-triangulation recordings suggested sparing of some subcortical structures and emphasized such cortical activity as remained. The actively spiking right-Sylvian epileptogenic focus complicated the encephalitic changes. Though no electroencephalogram was made prior to the vaccination, the past history leaves little doubt that two pathologic processes are represented in the records obtained during the second illness. It is equally likely that the pre-existing focus rendered the child more susceptible to seizures during the acute stage of the encephalitis. The slight improvement in the electroencephalographic findings one year after the onset of the encephalitis correlated with the slight clinical improvement. Both evidenced profound damage to the central nervous system.

No account of electroencephalographic changes in postvaccinal encephalitis appears in the literature, except for one listed among 240 cases of encephalitis described by Gibbs and Gibbs.[7] In their general discussion of encephalitis they noted that high-voltage slow activity characterized the acute stage. The changes were roughly proportional to the clinical severity of the illness and tended to regress in the subacute and chronic stages. Almost half of 180 patients followed had seizures after the acute stage of illness. Other reports[20-24] are in essential agreement on the changes in acute encephalitis. Presumably these electroencephalographic changes should be comparable with those of postvaccinal encephalitis, in view of the clinicopathological similarities mentioned. One of two cases (Case 2) reported by Globus and Kohn[20] most nearly resembles our case. Their patient, an eight-month-old male infant, developed seizures and lapsed into coma eighteen hours after his second pertussis vaccination. The electroencephalogram made on the sixth day showed severe depression of cortical function, and on the twelfth day the record was almost flat. Autopsy on the thirtieth day disclosed destruction of the entire cerebral cortex and lesser neuronal destruction in brain stem and cerebellum. No perivascular infiltrations were noted.

The question arises whether cerebral injury predisposes to the development of postvaccinal encephalitis. The possibility was suggested by Reisch,[25] but available statistics do not bear on that point.

This case serves to emphasize that postvaccinal encephalitis may result in severe, permanent damage to the central nervous system.

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MEDICAL PROGRESS

NEUROPSYCHIATRIC COMPLICATIONS OF VIRAL HEPATITIS*

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NERVOUS and mental complications in nonfatal acute virus (infectious) hepatitis are uncommon, despite the widespread occurrence of this disease. These complications may be grouped under two headings: structural involvement of the central or peripheral nervous systems and mental changes without proved disease in the nervous system that comprise coincidental and reactive mental disturbances.

Under the first heading are included meningitis, encephalitis, neuritis and myelitis. The incidence of meningitis is low. In 6 separate reports[1-6] dealing with a total of 1365 cases, mostly of the jaundiced variety and with few fatalities, only 1 case of a meningeal reaction was noted.[3] In a report on 151 patients (of whom 34 were not visibly jaundiced) from the Massachusetts Department of Public Health, Hardy and Feemster[7] included "stiff neck" as one of six symptoms recorded in 32 of the cases as evidence of central-nervous-system involvement, but the exact number of these patients who manifested a meningeal reaction was not given. The few existing clinical descriptions of this complication are derived from 6 communications[3, 8-12] that deal with a total of 15 such cases. The findings vary from nuchal rigidity and a normal spinal fluid to frank meningitis with spinal fluid under increased pressure and revealing moderate to high pleocytosis (usually predominantly lymphocytic) and increased protein content. In all except 1 of these 15 cases the meningeal signs were noted early in the illness before the onset of jaundice. The exception was the twenty-seven-year-old man, described by Waring,[9] in whom meningitis became evident five days after the onset of jaundice. Even with this exception, it is the rule for this complication to appear early in the illness and usually before jaundice is apparent. These findings suggest the anicteric form of Weil's disease, which is frequently complicated by meningitis.[13-15]

The manifestations of encephalitis are equally rare and also appear early in the illness as a rule, although they are less exclusively confined to the preicteric or early icteric stage. Brain[16] briefly mentioned the occurrence, in 1 patient who recovered completely, of unilateral convulsions and hemiplegia (together with mild polyneuritic symptoms) preceding the onset of jaundice. Cameron[4] made brief reference to temporary weakness of ocular accommodation in 3 patients in the preicteric stage. Three reports[5, 11, 12] specifically describe temporary blurring of vision in a total of 8 patients during the preicteric stage or within the first three days of jaundice. In one of these same reports[5] deafness was noted in 1 patient on the twentieth day of illness (it is assumed by the present writers that the condition had progressed well into the icteric stage) and 1 patient was described as developing unilateral paralysis of the seventh and ninth cranial nerves (the day of illness was not stated). Lescher[15] has reported the case of a twenty-four-year-old man who had acute infectious hepatitis in Persia and two months later, when discharged to duty as a driver, developed left hemiplegia of the upper-neuron type. The author presumed that the hemiplegia was due to a late complicating encephalitis, but this relation was not established with certainty.

The occurrence of polyneuritis, similarly uncommon, has been described in 10 cases by 6 observers.[7, 11, 15-18] Here, too, there is a tendency for this complication to set in early in the illness, before the appearance of jaundice. Notable exceptions, however, are the reports of Lelong and Bernard[17] and Zimmerman and his associates.[6] The first group of authors described the appearance of a symmetrical polyneuritis in the upper and lower limbs of a fourteen-year-old girl during the course of a relapse one month after the initial onset of her acute jaundice. Improvement was slow over the course of three months. The second group of authors mentioned that 1 of their patients developed a typical Guillain–Barré syndrome during the fourth week of the disease. From these few reported cases it appears that this neurologic complication usually requires at least several months to clear, being similar to the slow course of polyneuritis, which is not associated with hepatitis.

The occurrence of myelitis is the rarest of nervous-system complications. The only record of its occurrence is in a report by Byrne and Taylor,[11] who referred to an outbreak of 5 cases of icteric infectious hepatitis among British troops on the Burma front. All developed nervous-system involvement early (already referred to in this paper), but in one patient the signs were predominantly those of myelitis. Several months later this patient still manifested mild residual spastic paralysis of the lower limbs.

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In discussing the nervous and mental symptoms of acute virus hepatitis, the writers wish here to demarcate the usual patients, who recover, from those with the rare fulminant cases of the disease, who may die as early as several days after onset. It is a well documented observation that cerebral symptoms are often recorded in fatal cases.[3, 12,18-24, 25] They usually take the form of coma, delirium and convulsions. The final phase of fulminant virus hepatitis is marked by these and other mental changes as an ominous sign of extreme hepatic parenchymal failure. A clouded state of consciousness, with delirium and hallucinations, is common. Occasionally, in contrast to the gravity of the patient's condition, euphoria appears. A rise in temperature and pulse rate heralds the appearance of major mental changes. Lethargy or coma may alternate with restlessness, excitement, delirium, muscular weakness, exaggerated reflexes and hemorrhagic phenomena. The coma shows no distinctive diagnostic features. The patient seems asleep, and his true condition is revealed only when futile attempts are made to rouse him. There may be waxy rigidity of the limbs resembling that of Parkinsonism. Fine tremors and coarser involuntary abnormal movements may occur. Rarely, convulsions take place. The patient may remain for days in coma or a stuporous state, and death almost always follows soon. Recovery rarely takes place if this stage has been reached. This is the commonly encountered fatal picture in acute virus hepatitis, as it is in any rapid and irreparable failure of the liver parenchyma. As noted, psychotic reactions in this period are common.

Despite the prominence of these nervous manifestations in the terminal stage of hepatitis, the neurohistologic changes in the fulminant form are usually not impressive.[20] This is attributed to the rapid tempo of the disease, since, as a rule, cerebral manifestations precede death by only a few days. Cellular changes in the nervous system generally require longer periods to appear. Grossly, few pathologic changes have been noted. Microscopically, a nonspecific encephalopathy of mild degree is nearly always observed. The bodies of many ganglion cells are swollen, with distorted nuclei and dispersion of their chromatin granules. In the less fulminant fatal cases this nonspecific degeneration of the ganglion cells is similarly seen in all cases.[19] In 15 per cent of these cases there is also an additional reaction: a mild form of meningoencephalitis, located principally in the brain stem.

So much for the nervous and mental changes in the fatal cases. The mortality rate of infectious hepatitis is usually quoted as between 0.2 and 0.4 per cent.[21, 26] The majority of patients with acute virus hepatitis recover, therefore. The nervous and mental symptoms in the larger group of nonfatal cases are the principal consideration in this paper.

Profound mental depression is perhaps the most common and distressing symptom.[5,18] It may occur during the preicteric stage[3, 5, 12, 27] or during the icteric stage, when the jaundice is at its height.[1, 4, 5,28] In one large series of cases[5] its incidence was listed as 2.8 per cent. In this same series insomnia was more frequently encountered (5.5 per cent) and seemed to increase the depression. Drowsiness, headache, irritability and apathy are other commonly encountered mental symptoms, most often as prodromata[12, 27] but occasionally in the icteric stage.[28] Frank delirium prior to the onset of jaundice has been observed infrequently[2, 3] sometimes in association with a high fever.

In 6 of 295 cases reported by Zimmerman and associates[6] the following picture, which is said to herald a fatal outcome, was noted: There was a sudden reappearance of fever and extreme lethargy and drowsiness, with severe nausea and vomiting. All 6 of these patients had been deeply icteric, but this clinical change appeared from one to four weeks after the peak of the icterus. All 6 improved. In addition, 21 patients in this series showed transient emotional instability, querulousness, drowsiness, insomnia and tremor.

Except for the rare occurrence of delirium in the prodromal stage of the disease, psychotic reactions in the nonfatal cases are not described. (Hardy and Feemster[7] include temporary delirium as one of 6 nervous symptoms noted in 32 of their 151 patients but do not specifically state in how many patients it was encountered or at what stage of the illness.) It is the purpose of this paper to report the case of a patient who for three weeks manifested a major psychotic reaction at a time when his jaundice was clearing and to analyze those factors in his past history that were related to the psychotic reaction in this illness.

Case Report

M. R., a 30-year-old unmarried male teacher, was hospitalized on September 20, 1950, because of jaundice, loss of appetite, loss of weight and weakness. In June, 1950, he had received inoculations against typhoid fever and smallpox. His illness commenced 5 weeks previous to admission when, while visiting Israel, he developed diarrhea, intestinal "griping" and impaired appetite. His stools were clay-colored during the 3 weeks prior to hospitalization. His urine became increasingly dark. Jaundice of the eyes was definitely noted 2 days before hospitalization. He did not smoke.[29] He had taken no medication in recent months.

In 1935 he was hospitalized for 26 days with meningococcal meningitis. During the height of this illness he became depressed, suspicious and unco-operative. Members of the family recall his saying "I am going to die because death has always been my destiny." He recovered after treatment with meningococcal antiserum, given intrathecally and intravenously.

He had always been withdrawn and seclusive. He was excessively concerned with minor details of his work and with neatness and meticulous order. His only hobby was watch repairing. He had few friends, male or female. He maintained a close relation with his mother.

He was one of 5 male siblings. No illness similar to the present one existed in the family. Mental illness was denied.

On admission he was alert, co-operative and lucid and was not depressed. His temperature was normal. He appeared deeply jaundiced. There was no significant adenopathy. The liver and spleen were not palpable. There was tenderness on fist percussion over the right lower anterior rib cage. Neurologic examination was negative.

The presumptive diagnosis was acute viral hepatitis, probably of the serum-transmitted variety. Amebic hepatitis was considered in the differential diagnosis. Therapy consisted of complete bed rest; diet high in protein and carbohydrate, low in fat; supplementary vitamin B complex orally and vitamin K intramuscularly. The laboratory tests taken shortly after admission (Fig. 1) indicated parenchymal involvement of the liver. No amebas were found in the stool.

On the 2nd and 3rd hospital days the liver and spleen became palpable; the liver was tender. During the first 5 days in the hospital he became excessively observant of the color of his urine, of the character and color of his stool and of his exact fluid intake and output (which he recorded faithfully for the nurses). On the 6th hospital day he appeared depressed and expressed doubts about his recovery. On the seventh hospital day he moved and spoke less than formerly. He doubted that he would survive the ensuing 10 days — an important religious holiday period. He demanded that one of his family attend him at night.

His depression was unabated on the 8th hospital day. He refused aureomycin capsules, saying that they might harm him. He stated that he would jump out of the window were it not for his religious beliefs. He repeated stories of death, disjointedly. His voice remained low and his speech slow; he stared silently at the ceiling for long periods during interviews. Concomitantly, there were fine agitated movements of the extremities. His memory was defective for events of recent history. He refused most examinations. Food and medication were forced on him by members of the family. Neurologic examination remained negative.

This psychotic reaction continued during the 2nd week. In the 3rd week the depression was less marked, but negativism and hostility became more prominent. His sensorium was less clouded. He was more agitated, especially at night, and did not sleep at night for one 3-day period. Barbiturates were withheld because of the underlying liver damage. Finally, 4 cc. of paraldehyde was administered intramuscularly on 2 successive nights; he slept after each injection.

At the end of the 3rd week he was allowed out of bed. A marked clearing of the psychotic reaction followed ambulation. Within 24 hours his mood changed to one of relative cheerfulness. His memory and sensorial status in general showed no defects.

The jaundice had been gradually receding and was no longer clinically detectable 1 week after he had been allowed out of bed. The chemical and other laboratory findings returned toward normal (Fig. 1). His appetite improved, and his weight rose to 155 lb. from a minimum of 147 lb. in the 2nd week.

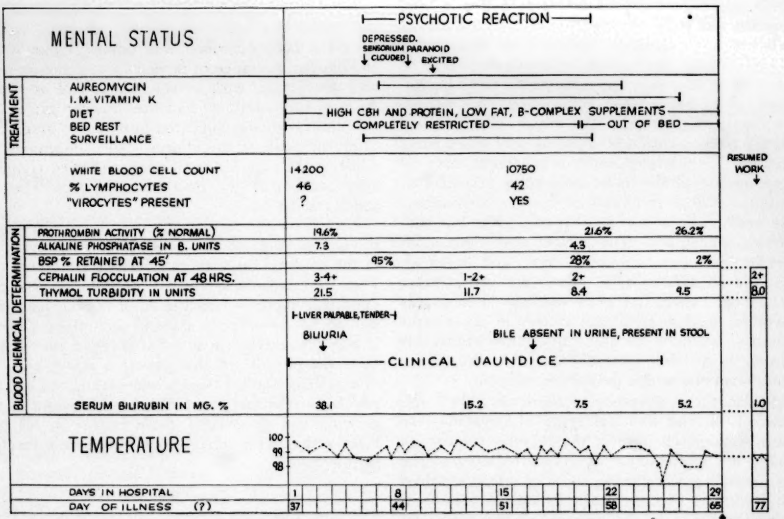

FIGURE 1. *Clinical and Laboratory Data on Patient M. R.*

Re-examination 12 days after discharge revealed no abnormal physical findings. He was eating well and had gained 5 lb. He refused to submit to further neuropsychiatric examination. His family have subsequently reported that he is feeling well, is actively working and has limited social contacts.

DISCUSSION

Mental disturbances with infectious hepatitis may be classified under three headings: mental illness

that is coincidental and not directly associated with the hepatitis; reactive mental disturbance; and mental illness that is apparently caused by the infection.

Group 1: Mental Illness Coincidental with the Hepatitis

This is common because of the high incidence of both mental illness and acute viral hepatitis. There are about 700,000 patients in mental hospitals in the United States at present, or 55 per cent of the total number of patients in all hospitals,[30] and there are many more persons who receive or require intensive psychiatric treatment. Reviewing the statistics for New York and Massachusetts, Landis and Page[31] estimated that "at some time during the calendar year, about 1 per cent of the adult population is under care in mental hospitals, while during their lifetimes 5 to 6 per cent of their population will spend some time in mental hospitals." Statistically, therefore, we may expect to find cases of mental illness that are concomitant with hepatitis. An example of this group is the case of a forty-seven-year-old woman whom one of us observed in 1948, when she was admitted to a psychiatric hospital with the history and signs of infectious hepatitis, after a suicide attempt. She had been depressed and suicidal for several months at the age of twenty-six; at thirty-nine she had attempted suicide for the first time and had been committed to a state hospital with the diagnosis of manic-depressive psychosis.

Group 2: Reactive Mental Disturbances

This category includes emotional reactions that occur in persons who are predisposed to mental illness and that follow the trigger action of some adverse change in their external or internal environment. For example, one of us recently observed a forty-two-year-old man who developed the signs and symptoms of acute cholecystitis and, simultaneously, a paranoid psychosis in which he said that the "g's and b's will get me" and that the doctors wanted to kill him and incinerate his sexual organs. He was well oriented and had a clear sensorium. The psychiatric picture was indistinguishable from that of paranoid schizophrenia. This man had been shy and seclusive, having no friends except for his younger brother who the patient said "took advantage of him." Although he was a graduate of a law school, the patient had been working as a cashier in a restaurant. After his cholecystitis subsided and he was allowed out of bed, he suddenly improved mentally. His delusions and hallucinations disappeared and he said that he had always been "nervous" — that when he had broken his ankle in college he had the "same sort of nervous breakdown." Thus this patient first experienced a decompensation of his personality adjustment under the stress of a fracture and later experienced another under the stress of an acute inflammation of his gall bladder.

Group 3: Neuropsychiatric Disturbances Apparently Due to Infectious Hepatitis

This third group differs from the preceding two in that there is unquestioned organic disease of the nervous system in all such cases. In the previous two groups there is no conclusive proof of organic nervous-system disease.

Three theories have been proposed[18] for the mechanism by which the nervous system is affected in viral hepatitis: The infectious agent (presumably a virus) may become neurotropic and attack the nervous system; liver cells that are autolyzed may produce a toxin that may affect the nervous system; toxins coming from the gut may pass through the diseased and incompetent liver and thus affect the nerve tissue.

Interest in the relation between hepatic and cerebral disease has been stimulated by Wilson's classic description of hepatolenticular degeneration, a heredofamilial disease characterized by extrapyramidal and pyramidal signs, a characteristic pigmented corneal ring, mental changes and liver disease.[32] Autopsies reveal a lobar cirrhosis of the liver and lesions in the basal ganglia and cerebral hemispheres. Although Wilson did not at first emphasize the mental changes and the pathologic findings in the cerebral cortex, other investigators later confirmed and emphasized these observations.[33-35] Areas of demyelination are seen in both the cerebral cortex and the basal ganglia, often about the blood vessels.

Further comparison has shown that there is no major difference in the brain conditions noted in fatal cases of Wilson's disease, cirrhosis of the liver, infectious hepatitis and other "acquired disease of the liver"[33-37]; this view is supported by experimental observations in dogs.[38] During their last week of life human patients with these diseases showed diverse neurologic abnormalities, ranging from signs of diffuse encephalitis to those of peripheral neuritis, but often with coma or delirious reactions.

Our patient's delirious reaction improved markedly a short time after he was allowed out of bed and permitted to sit in a chair. Although the value of treatment in the upright position for patients with delirious conditions or for aged persons is well known, the mechanism by which this position helps the patient is poorly understood.

Many delirious patients or older persons show marked anxiety when confined to bed and feel less constrained when allowed to sit up in a chair. Another possible explanation is based on the change in blood flow and oxygen uptake in the upright position. With the technic of Kety and Schmidt[39] it has been shown that when normal persons and

patients with cerebral disease are tilted from a horizontal to an upright position the arterial blood pressure falls and the cerebral blood flow decreases but there is a compensatory increase in the arteriovenous-oxygen difference to such an extent that the cerebral oxygen utilization (cerebral blood flow × arteriovenous-oxygen difference) does not change.[40-42] The investigators who have studied the effects on cerebral circulation of tilting the head up or down have placed the subject or patient in a horizontal resting posture, strapped to a tilt table or rigidly confined within a mechanical apparatus. The firm fixation of the subject in the apparatus has been necessary, of course, for the proper maintenance of position of cannulas and other equipment. However, the immobility that has been enforced in the subject in the experimental situation is not a feature of clinical treatment. Clinically enforced bed rest in the horizontal position is generally a position of relative freedom of movement. Thus the positions in these experiments do not correspond completely with those of clinical practice.

Experience with electroencephalography also fails to yield a satisfactory explanation of clinical improvement with change in position. The electroencephalogram is taken in either a sitting or a horizontal supine position but with the patient relatively free to make movements of small amplitude. The only reported difference in the electroencephalograms made in the horizontal and sitting positions is that the changes that follow hyperventilation are more pronounced while the subject is in the sitting position. Since the reason for the hyperventilation reaction in the electroencephalograms in any position is unknown at present, this observation does not further explain the difference in the clinical reactions observed in the sitting and lying positions.

It should be recalled that man's posture is primarily an upright one, unlike that of most other mammals. Pending detailed physiologic explanation, it is suggested that the improvement clinically noted in delirious or aged persons when they are placed in an upright position may consist in restoring the patient to a position that is biologically and psychologically more nearly normal.

The patient whose case is reported herein shows two different types of mental disturbance: a reaction to the infection, consisting of concentration and aggravation of his lifelong personality abnormalities and an acute delirious reaction that cleared satisfactorily with the remission of the physiologic disturbance of his liver. Thus his mental illness falls into both Group 2 and Group 3 in the classification previously presented; that is, he demonstrated a reactive depression of severe degree that was precipitated by the viral infection, but he also showed a mild delirious reaction that was presumably due to transient organic changes in the brain secondary to the viral infection. Although its actual occurrence is rare (as has previously been pointed out), any severe case of infectious hepatitis *may* be complicated by a delirious reaction that tends to clear upon recovery from the acute infection. Our patient illustrates this rare occurrence, but in addition he remains a person with an abnormal personality who may well respond to a future major stress with a psychotic reaction, as in the present illness.

Summary

The case of a thirty-year-old man with a psychotic reaction complicating acute infectious (viral) hepatitis with recovery is presented.

This patient demonstrated a mild delirious reaction that, for the most part, clinically paralleled the course of the hepatitis and also a reactive depression based on the patient's previous personality and precipitated by the acute infection.

The delirious condition of this patient improved strikingly when he was allowed out of bed prematurely insofar as his hepatitis was concerned. No clear explanation of this improvement of the mental illness with change in position is advanced, but several possible factors are discussed.

The literature concerned with the nervous and mental changes in acute virus hepatitis is reviewed. Central and peripheral nervous-system complications are rare; they include meningitis, encephalitis, neuritis and myelitis. In the nonfatal cases mental changes are equally rare; psychotic reactions are not described, except for the rare occurrence of delirium in the prodromal stage. In the small group of fatal cases, nervous and mental symptoms are common and may dominate the terminal picture. Autopsy studies reveal few gross pathologic changes. Microscopical examination reveals a mild nonspecific encephalopathy and, occasionally, a mild form of meningoencephalitis, principally in the brain stem.

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MEDICAL INTELLIGENCE

TUCKER'S WIFE'S LEG

ROBERT W. BUCK, M.D.

BOSTON

IN August, 1752, three months before his seventeenth birthday, John Denison Hartshorn of Concord, Massachusetts, came to Boston (population 16,500) to study medicine with Dr. Silvester Gardiner, who was then at the height of his career as a successful surgeon-apothecary. His shop was on Marlborough (now Washington) Street, at the corner of Winter. The boy apprenticed himself to the doctor for five years, and his master undertook to instruct him in Physick, Surgery and the business of an apothecary. Before John's term of service was completed, preparations began for the war against the French, and the young medical student died of typhus fever contracted while tending the victims of an epidemic among the British troops encamped in Boston.

His diary is preserved at the Boston Medical Library. The entries, in script as legible as print, doggedly record each day's events — first, what he had to eat; then a brief account of his professional chores. His artless history of the case of Tucker's wife's leg inspires gratitude that one did not live in Boston two centuries before penicillin.

Hartshorn was in the third year of his studies when, on January 31, 1755, he was called "to dress Mr. Tucker's Wife's Leg; it was a Large Ulcer." He notes that he apply'd a dossill (a small pledget) of Lint armed with Linimentum Arcaei (rosin and turpentine) and Dig. Praecip. (*digestivum praecipitatum*, a digestive used to promote ripening of pus and usually containing turpentine, egg yolk and oil of roses or hypericum). For three weeks the record varies little from day to day:

Feb. 3. Ed. [*edi*, I ate] *Rice, Boyled Leg Pork & Potatoes, Bread & milk. . .Drest Tucker's wife's leg. . .*
Feb. 4. Ed. Cho. [chocolate], *Boyled Rice & Cabbage, Roast Turkey. . .Drest Tucker's wife. . .*

Occasionally he airs his Latin:

Feb. 5. . . visitavi Tucker's uxorem & drest ejus Crus.
Feb. 6. Ed. Cho., Chowder; no Sup. . .Drest Tucker's Wife's Leg. . .
Feb. 7. Ed. Ch., Pork & Peas, Bread & milk. . .Went & drest Tucker's wife's leg. She had worms. I gave her ℥i *Bailey's worm powder. . .*
Feb. 9. . .Went to dress Tucker's wife. . .

And so on, until:

Feb. 21. Ed. Cho., Pork & Peas, Bread & milk. . .Drest Tucker's wife. Went again at night. She had an exquisite pain acrost her abdomen which almost caused convulsions, her body [bowels] *regular. I gave her* ℥i *Calomel. . .& ordered her to drink plentifully of Tea made of Marshmallows, which soon gave her Ease.*

On March 2 he discovered "a Sinus running an inch towards her ancle, out of which issued Ichor." On March 6 Dr. Gardiner "suspected the Bones was defective" and told his apprentice to fill the sinus with dossills armed with digest. praecip., which is just what John had indefatigably been doing for more than five weeks. He followed directions and kept up the daily visits.

In the middle of March John was sent to Springfield to collect an old account owing to the Doctor.

Having provided himself with a writ of attachment, he mounted old Ranger and set out, arriving at 10 p.m. in Worcester, where he lodged with a Mrs. Stearns. He says he had "harshed Veal & Turnip for Supper, eat for breakfast Tea and Toast" and paid 16 shillings and sixpence for the accommodation. He stopped on the following night at Cold Spring, which he found "a very unpleasant place, very poor Huts, the roads uneven & full of Water as the freshetts were very high, but lodged well, had a drink of bear & supped on apple pye and Cheese."

In Springfield he searched the records and unfortunately found all the debtor's lands already made over to another creditor. Completion of legal formalities and the return trip took several days; he arrived back in Boston in time for dinner on March 21. On the following day:

March 22. Ed. Salt Fish, Bread & Milk. . .Went to dress Tucker's wife, found her in much pain, the external part of her ancle. Jepson [the senior apothecary] *had put a caustic on when I was gone, but* [it] *had not cast off. I drest by filling the sinus with Lint & a digest over all. . .*

March 23. Ed. Cho., Boyled Veal & Turnip, apple & minc'd Pye. . .Drest Tucker's wife by introducing dossills of Lint into the Sinus to dilate it. . .apply'd a poultice of Bread & milk & ung. Dialth. [*unguentum de althaea*, a marshmallow ointment]; *could discover the head of the Tibia w'h my Probe.*

The young medical man persisted in his efforts to help Mistress Tucker day after interminable day. He tried "a sticking plaister w'h a Hole in the middle, applied the Lapd. Infernal [*lapis infernalis*, crude potassium carbonate obtained by evaporating and calcining lye] & then a Slip of plaister over that, and in two hours took it off and put on a pledget of Digest." He made an eschar with the caustic; he made a small incision with his lancet, and there came forth a large quantity of pus; he drest and drest and drest, all through April. On the first of May, the sore was fetid, which gave him a "suspicion of the Bones being Carious."

May 6. Ed, Cho., Boyled Beef. No Supper. . .Went to see Mrs. Tucker, a Large Cavity appeared between her Os Calcis & the head of the Tibia. I injected Tinct. myrrh & aloes to deterge it, fomented it, etc., put her under a Diet drink made as follows. Rx. Sarsaparil. ℥iis, Sassafras ℥i, Senna, Turpeth, Hermodactyl, Polypod. of the Oak, each half an ounce, Cinamon & Liquorice and ℥is Antim. I rad. grosly Pulv. & tied in a Rag. Boyl 24 hours in 3 quarts Water to 3 quarts.

No improvement ensued, however; the patient worsened. She developed a cough, vomiting and weakness. Several new sinuses appeared. On May 17 she was delirious with "a symptomatic fever caused by pain." Finally, on the 26th, Dr. Gardiner himself saw the young woman and concluded that she had a Static. She must have her leg laid open or cut off, or she must die.

May 29. Ed. Cho., Pork & Peas, no Supper. . .Dr. Gardiner, Doctr. Thos Williams, Doct. Pecker, Jepson & myself, went and amputated Tucker's wife's leg, after much persuasion & many arguments. We sat her in a chair & put a Large Bowl of Sand under her, applyd the Tourniquet with a Compress or two upon the arteries, I handed the instruments, Dr. Williams held the tourniquets, after binding a Tape round the Leg about 5 inches below the patella for a Guide to the Knife. D.G. began the Incision & divided quite thro the membrana adiposa, then Pecker drawing the Skin tought, next the muscles were divided, then the Catlin [catgut, or a catgut string] *to divide the interosseous muscles, then w'h the Saw the Leg was separated, five vessels were taken up, Lint apply'd & 2 pledgets Digest over them, Two longitudinal compresses, three double headed Bandages, afterwards an anodyne of Batm. drops ℥ss.* [*Balsamum anodynum Bateanum*, or anodyne balsam of Bates, made of opium, camphor, saffron and spirits of wine]. *Brought the leg home & Pecker dissected it. Fine day. . . I was sent for to Tucker's in the afternoon they fearing a Hemmorage, but I found it only a serous oozing.*

Two days later he reports that he had watched with Tucker's wife all night. He says she rested but little, was something delirious, was very droughty (thirsty), sweat profusely, urined once, no stool. But the patient made an uninterrupted recovery. On June 19, to be sure, she had one or two sloughs on her stump, but the doctor's disciple easily took care of these. He apply'd Dig. Praecip. and touched w'h Vitriol Rosmar [copper sulfate]. The visits continued throughout July and August.

July 2. Ed. Cho., my own, Roast Lamb & Baked Pudding, no supper. . .Drest Tucker's wife & . . .drank a glass of madeira.

July 3. Ed. Cho., my own, fast day. . .Drest Tucker's wife and drank some punch there.

By this time of course, Tucker's wife and the young apprentice must have become pretty well acquainted.

Toward the end of July there appears one of John's rare reports on current events:

July 23. Ed. Cho., Fry'd Cod & harshed Beef. . .News from the Ohio that Gen'l Braddock was killed & his army defeated, his whole artillery being taken. [This was only ten days after the date of the famous defeat!]

However, Mistress Tucker's steady progress and the regular visits continued without interruption. By the end of September there had been a total of 170 visits over a period of eight months, and at last:

September 20. Ed. Cho., salt fish, no Supper. . .Tucker's wife quite well. . .

Naturally, John continued to drop by from time to time. Tucker's wife had the heart burn December 22; in February, 1756, she hurt her stump; in March he visited "Mr. Tucker's Mother, a woman of about 50"; March 6-14 he had to make four visits to Tucker's wife, as the stump of her leg had got foul and required several applications of Digest. Praecip. It was clean on the occasion of the last visit.

The final notation, written nine months and a day after that July evening when the young surgeon drest Tucker's wife & drank some punch there, may indeed give rise to some sober speculation, but *honi soit qui mal y pense:*

April 4. Ed. Ch., Boyled mutton, for Sup. fry'd Veal. . . Went to see Tucker's wife who was yesterday brought to Bed of a girl. Went to Chapel forenoon and to Eliot's meet'g afternoon. Cold day, had the headach much at night. . .

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

Weekly Clinicopathological Exercises

FOUNDED BY RICHARD C. CABOT

BENJAMIN CASTLEMAN, M.D., *Editor*

VIRGINIA W. TOWNE, *Assistant Editor*

CASE 38241

PRESENTATION OF CASE

A forty-seven-year-old man was admitted to the hospital because of dimness of vision and increased lacrimation in the left eye.

Three years before admission the patient first experienced increased lacrimation in both eyes, worse in the right; a chalazion of the right eye was incised and curetted at that time, with only temporary improvement. Shortly after this he noticed slight dimming of the visual acuity in the left eye. When he was seen at the Out-Patient Clinic two years prior to entry, his vision was 20/30 in both eyes and the exophthalmometer readings were 17 mm. in the right eye and 20 mm. in the left eye, the left puncta was very small and there were slight inflammatory thickenings of the upper and lower left eyelids, a full range of motion and good convergence in both eyes and no difference in the width of the palpebral fissures of the two eyes. He was treated with mydriatics and by probing of the left lacrimal duct; following this the lacrimation became less marked, but the dimness of vision was slowly progressive. One year before admission he first noticed slight bulging and redness of the left eye. Five weeks prior to entry, he noticed a blue color to objects observed with the left eye. Two weeks before admission he consulted an ophthalmologist, who found a left nonpulsating exophthalmos of about 3 mm., atrophy of the temporal portion of the optic-nerve head, visual acuity of 20/30 in the right eye and 20/200 in the left eye and a profound, dense sector scotoma inferiorly and an upper-sector defect peripherally.

For the three years before admission, he had had recurrent frontal headaches that were relieved by aspirin but sometimes required up to six tablets daily for relief. These recurred at intervals of about two weeks and had not increased in either frequency or severity since the onset. The headaches were described as a feeling of heaviness in the head, were not localized to either side and were not accompanied by vomiting but were sometimes accompanied by dizziness and a partial loss of balance. There had been no pain in the eye, photopsia or halos about light.

Seventeen years prior to entry he was investigated for vasomotor instability in the hands and feet that had been present at that time for a few years and was somewhat disabling in winter. This had cleared up spontaneously over the subsequent few years.

Physical examination revealed a well nourished man in no distress. The cranium was symmetrical. There was some degree of exophthalmos of the left eye. In both eyes the eye movements, eyelids, lashes, lacrimal apparatus, conjunctiva, pupils and cornea were not remarkable. The opticokinetic responses were normal and there was no diplopia or nystagmus. The visual acuity and visual-field defect were unchanged from the outside examination. The thyroid gland was not palpable. Examination of the heart, lungs, abdomen and neurologic system was negative.

The temperature was 98°F., the pulse 80 and the respirations 20. The blood pressure was 140 systolic, 80 diastolic.

Examination of the blood showed a hemoglobin of 16 gm. and a white-cell count of 6500, with a normal differential. A urine, of specific gravity 1.018, was normal. Lumbar puncture showed a pressure equivalent to 180 mm. of water with normal response to jugular compression and respiration; the fluid was clear and contained one lymphocyte per high-power field and 58 mg. per 100 cc. of protein. A roentgenogram of the skull demonstrated a hazy area of increased bone density in the region of the left greater wing of the sphenoid with elevation of the sphenoid ridge; the optic foramens were normal and equal. An electroencephalogram showed a normal record.

On the sixth day an operation was performed.

DIFFERENTIAL DIAGNOSIS

DR. DAVID G. COGAN*: May I see the x-ray films?

DR. JAMES J. MCCORT: The skull series demonstrates a striking thickening and increased density of the lesser and greater wings of the left sphenoid bone (Fig. 1 and 2). This increased density extends from the region of the left anterior clinoid as far laterally as the temporal fossa in the region of the pterion. The left superior orbital fissure, compared to the right side, is slightly narrow as the result of the thickening. On one film I wonder if the left optic foramen is not slightly decreased in size as compared to the right. On the base view, there is a fine mottling of the bone in the region of the greater wing, which suggests increased vascularity.

DR. JOSEPH C. AUB: What about the frontal sinuses? Aren't they quite large?

DR. MCCORT: The sinuses are larger than normal but are clear and well aerated.

*Associate surgeon in ophthalmology, Massachusetts Eye and Ear Infirmary.

DR. COGAN: If I am correct in my interpretation of the case I shall have to disregard judiciously a great many of the signs and symptoms that this patient had. I cannot link a chalazion with a condition producing this x-ray picture. The tearing, I suppose, suggests thyroid dysfunction, but that was not borne out by the subsequent course of events. The complaint by the patient of seeing blue with the left eye I presume had some significance, — at least it went along with the rest of the picture, — but I do not know how to interpret it. It seems to me that the only symptoms that can be reliably subjected to analysis are the x-ray picture, the history of progressive loss of vision over a period of two or three years with accompanying optic atrophy and the exophthalmos of two or maybe three years' duration.

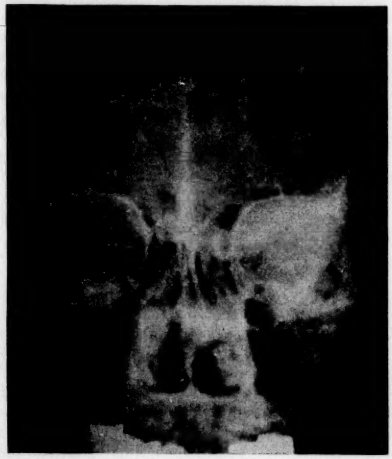

FIGURE 1. *Roentgenogram of Skull.*
Arrows point to areas of thickening and increased density of sphenoid bone.

The course is certainly suggestive of tumor, but I suppose that before I accept that diagnosis I should consider the relatively common pseudotumor of the orbit — a chronic granuloma, which is a definite clinical entity though of unknown etiology. Pseudotumors occur in patients of this age group, particularly in males. Their course, however, is different from the course in this patient. The granulomas appear in a period of a few weeks, last for a matter of months and then resolve. They are not steadily progressive; they are accompanied by considerable pain and discomfort, signs of congestion about the eyes and limitation of eye movements, which were not present in the case under discussion; usually they are accompanied by an enlarged preauricular lymph node. I think that pseudotumor is clearly eliminated.

A dysthyroid exophthalmos, which was apparently considered by some of those who were studying the case, is a definite possibility. It is not necessary that the patient have signs of hyperthyroidism, as a so-called thyrotropic type of exophthalmos, supposedly pituitary induced, may occur without other evidence of thyroid disturbance. Although it occurs chiefly after thyroidectomy, it may occur spontaneously. Against that diagnosis is the absence of any congestion over the rectus muscles, the persistent unilaterality and the lack of any limitation of eye movements, which is so common with that type of exophthalmos.

What types of tumor of the orbit produce exophthalmos and reduction in vision? The most common tumor of the orbit is a hemangioma, but I do not think that needs to be considered, as hemangiomas of the orbit always appear in childhood. This patient was about forty-five years old when the tumor appeared. Dermoids are the second commonest tumor of the orbit. Their onset also is not commonly seen after childhood. Lymphoma, a not uncommon type of tumor in an adult, is a definite possibility. However, the x-ray picture is not consistent with this; I believe a lymphomatous tumor would produce a thinning of the bone, not an increased density such as this patient had. The x-ray findings similarly rule out a metastatic carcinoma or extension of a nasopharyngeal tumor, all of which can produce exophthalmos.

FIGURE 2. *Roentgenogram of Skull.*
Arrows point to areas of thickening and increased density of sphenoid bone.

The two types of tumor that characteristically begin with reduction in vision and later produce exophthalmos are glioma and meningioma. Gliomas of the optic nerve are almost exclusively found in

childhood. By the time such a tumor was massive enough to produce a gross exophthalmos, it certainly would have produced a completely blind eye, which was not the case here.

I am left with what seems to me the only reasonable diagnosis — that is, a meningioma. Meningiomas of the optic nerve, although they may begin in the orbit, usually begin intracranially and extend to the orbit; they produce an exophthalmos not alone by direct extension but by the bony thickening of the orbital wall. Before I saw the striking x-ray films I assumed that the meningioma involved at least the medial portion of the sphenoid ridge. Meningiomas of the sphenoid ridge that begin at the outer portion are more often evident through bulging into the temporal fossa; they produce disturbances in ocular motility by involving the optic foramen before they produce visual disturbances. Those that produce visual disturbances originate in the medial portion of the sphenoid ridge. The spinal-fluid-protein findings are compatible with a meningioma in this region. The absence of any intracranial signs is not exceptional, as in this region these meningiomas are characteristically tumors of the *en-plaque* type without much bulging into the cranial fossa. They may be widespread and still not produce much bulge to interfere with intracranial function. Moreover, I should consider the x-ray films diagnostic in themselves of a meningioma of the sphenoid ridge.

Dr. Benjamin Castleman: Would that be the radiologist's diagnosis?

Dr. McCort: Yes; it was almost a unanimous opinion when the films were shown.

A Physician: Do ossifying fibromas usually occur in this region as they do in the maxilla?

Dr. James C. White: True osteomas may occur in the bones of the orbital roof. I think that should be considered in the differential diagnosis. Sometimes it is very difficult to tell whether a lesion is an osteoma or a meningioma.

Dr. Castleman: Ossifying fibromas, which are probably the same as fibrous dysplasia, are common in the maxilla; I have never seen them up this high, although there is no reason that they should not occur in the sphenoid.

Dr. Cogan: Could Paget's disease produce a localized lesion?

Dr. McCort: I have never seen it localized in this region.

Clinical Diagnosis

Meningioma of sphenoid ridge.

Dr. Cogan's Diagnosis

Meningioma of sphenoid ridge.

Anatomical Diagnosis

Meningioma of sphenoid ridge.

Pathological Discussion

Dr. White: We thought it was a meningioma because of the thickening of the pterion and the involvement of the greater sphenoid wing and orbital fissure. The spinal-fluid protein was consistent with that diagnosis. We wondered whether the elevation in the protein indicated tumor within the dura or whether it was a meningioma *en plaque*.

The enormous frontal sinus, which Dr. Aub commented on, was a distinct nuisance at operation. It was the type of sinus that we see in acromegaly, but there was no evidence of acromegaly. We like to turn down the bone flap as low as we can with the frontal sinus permitting, because it is easier to elevate the frontal-lobe dura. We had to make the midline burr hole higher than usual. When we had turned down the bone flap, we were struck by the enormous thickening of the bone at the pterional point, the point at which the sphenoid joins the lateral portion of the skull. The bone, which was as thick as my finger, could not be grasped in the rongeurs. To remove this involved bone in the greater wing of the sphenoid and in the lateral wall of the orbit, we made two drill holes and then cut away with the rongeurs. Then, with the dura elevated and without exposing brain, we tapped an opening in the roof of the orbit, which is usually so thin that it transmits light, and removed the greatly thickened roof in the lateral portion of the orbit and the lesser wing of the sphenoid. The tumor did not involve the ethmoid cells. With the superior orbital fissure exposed, we removed most of the greater wing of the sphenoid. The dura did not appear to be affected in any way; there was no tumor inside it.

We have seen tumors with soft-tissue intradural extension filling a large portion of the floor of the middle fossa of the skull. One such patient died because we operated on the orbital part of the tumor first rather than on the huge intradural extension of the tumor. The operative manipulations of such a large tumor cause swelling of the brain. That patient died of increased intracranial pressure. If we had removed the soft-tissue portion of the tumor first and then removed the orbital part, we might have succeeded.

Do you think that there was any tumor-invaded bone left in this case?

Dr. McCort: Since the operation was so recent, adequate postoperative films have not been obtained.

Dr. White: If there is, he will be quite certain to have at least a ten-year period of freedom from trouble. We have had 12 meningiomas that invaded the orbital bone. One patient died of recurrence after fifteen years; the others had more or less brief five-year follow-ups; so far they are all free. A number of other patients with meningiomas in other areas after subtotal removal had recurrences after fifteen years. One cannot always remove all the dura or bone that is involved. A few active tumor

DR. COGAN: If I am correct in my interpretation of the case I shall have to disregard judiciously a great many of the signs and symptoms that this patient had. I cannot link a chalazion with a condition producing this x-ray picture. The tearing, I suppose, suggests thyroid dysfunction, but that was not borne out by the subsequent course of events. The complaint by the patient of seeing blue with the left eye I presume had some significance, — at least it went along with the rest of the picture, — but I do not know how to interpret it. It seems to me that the only symptoms that can be reliably subjected to analysis are the x-ray picture, the history of progressive loss of vision over a period of two or three years with accompanying optic atrophy and the exophthalmos of two or maybe three years' duration.

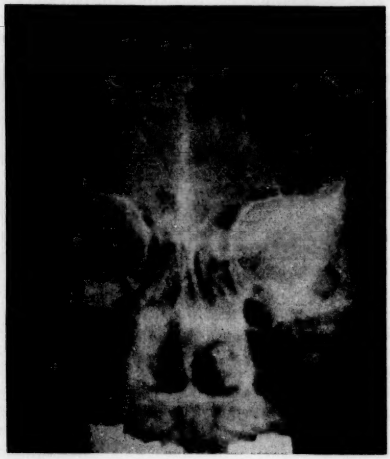

FIGURE 1. *Roentgenogram of Skull.*
Arrows point to areas of thickening and increased density of sphenoid bone.

The course is certainly suggestive of tumor, but I suppose that before I accept that diagnosis I should consider the relatively common pseudotumor of the orbit — a chronic granuloma, which is a definite clinical entity though of unknown etiology. Pseudotumors occur in patients of this age group, particularly in males. Their course, however, is different from the course in this patient. The granulomas appear in a period of a few weeks, last for a matter of months and then resolve. They are not steadily progressive; they are accompanied by considerable pain and discomfort, signs of congestion about the eyes and limitation of eye movements, which were not present in the case under discussion; usually they are accompanied by an enlarged preauricular lymph node. I think that pseudotumor is clearly eliminated.

A dysthyroid exophthalmos, which was apparently considered by some of those who were studying the case, is a definite possibility. It is not necessary that the patient have signs of hyperthyroidism, as a so-called thyrotropic type of exophthalmos, supposedly pituitary induced, may occur without other evidence of thyroid disturbance. Although it occurs chiefly after thyroidectomy, it may occur spontaneously. Against that diagnosis is the absence of any congestion over the rectus muscles, the persistent unilaterality and the lack of any limitation of eye movements, which is so common with that type of exophthalmos.

What types of tumor of the orbit produce exophthalmos and reduction in vision? The most common tumor of the orbit is a hemangioma, but I do not think that needs to be considered, as hemangiomas of the orbit always appear in childhood. This patient was about forty-five years old when the tumor appeared. Dermoids are the second commonest tumor of the orbit. Their onset also is not commonly seen after childhood. Lymphoma, a not uncommon type of tumor in an adult, is a definite possibility. However, the x-ray picture is not consistent with this; I believe a lymphomatous tumor would produce a thinning of the bone, not an increased density such as this patient had. The x-ray findings similarly rule out a metastatic carcinoma or extension of a nasopharyngeal tumor, all of which can produce exophthalmos.

FIGURE 2. *Roentgenogram of Skull.*
Arrows point to areas of thickening and increased density of sphenoid bone.

The two types of tumor that characteristically begin with reduction in vision and later produce exophthalmos are glioma and meningioma. Gliomas of the optic nerve are almost exclusively found in

childhood. By the time such a tumor was massive enough to produce a gross exophthalmos, it certainly would have produced a completely blind eye, which was not the case here.

I am left with what seems to me the only reasonable diagnosis — that is, a meningioma. Meningiomas of the optic nerve, although they may begin in the orbit, usually begin intracranially and extend to the orbit; they produce an exophthalmos not alone by direct extension but by the bony thickening of the orbital wall. Before I saw the striking x-ray films I assumed that the meningioma involved at least the medial portion of the sphenoid ridge. Meningiomas of the sphenoid ridge that begin at the outer portion are more often evident through bulging into the temporal fossa; they produce disturbances in ocular motility by involving the optic foramen before they produce visual disturbances. Those that produce visual disturbances originate in the medial portion of the sphenoid ridge. The spinal-fluid-protein findings are compatible with a meningioma in this region. The absence of any intracranial signs is not exceptional, as in this region these meningiomas are characteristically tumors of the *en-plaque* type without much bulging into the cranial fossa. They may be widespread and still not produce much bulge to interfere with intracranial function. Moreover, I should consider the x-ray films diagnostic in themselves of a meningioma of the sphenoid ridge.

Dr. Benjamin Castleman: Would that be the radiologist's diagnosis?

Dr. McCort: Yes; it was almost a unanimous opinion when the films were shown.

A Physician: Do ossifying fibromas usually occur in this region as they do in the maxilla?

Dr. James C. White: True osteomas may occur in the bones of the orbital roof. I think that should be considered in the differential diagnosis. Sometimes it is very difficult to tell whether a lesion is an osteoma or a meningioma.

Dr. Castleman: Ossifying fibromas, which are probably the same as fibrous dysplasia, are common in the maxilla; I have never seen them up this high, although there is no reason that they should not occur in the sphenoid.

Dr. Cogan: Could Paget's disease produce a localized lesion?

Dr. McCort: I have never seen it localized in this region.

Clinical Diagnosis

Meningioma of sphenoid ridge.

Dr. Cogan's Diagnosis

Meningioma of sphenoid ridge.

Anatomical Diagnosis

Meningioma of sphenoid ridge.

Pathological Discussion

Dr. White: We thought it was a meningioma because of the thickening of the pterion and the involvement of the greater sphenoid wing and orbital fissure. The spinal-fluid protein was consistent with that diagnosis. We wondered whether the elevation in the protein indicated tumor within the dura or whether it was a meningioma *en plaque*.

The enormous frontal sinus, which Dr. Aub commented on, was a distinct nuisance at operation. It was the type of sinus that we see in acromegaly, but there was no evidence of acromegaly. We like to turn down the bone flap as low as we can with the frontal sinus permitting, because it is easier to elevate the frontal-lobe dura. We had to make the midline burr hole higher than usual. When we had turned down the bone flap, we were struck by the enormous thickening of the bone at the pterional point, the point at which the sphenoid joins the lateral portion of the skull. The bone, which was as thick as my finger, could not be grasped in the rongeurs. To remove this involved bone in the greater wing of the sphenoid and in the lateral wall of the orbit, we made two drill holes and then cut away with the rongeurs. Then, with the dura elevated and without exposing brain, we tapped an opening in the roof of the orbit, which is usually so thin that it transmits light, and removed the greatly thickened roof in the lateral portion of the orbit and the lesser wing of the sphenoid. The tumor did not involve the ethmoid cells. With the superior orbital fissure exposed, we removed most of the greater wing of the sphenoid. The dura did not appear to be affected in any way; there was no tumor inside it.

We have seen tumors with soft-tissue intradural extension filling a large portion of the floor of the middle fossa of the skull. One such patient died because we operated on the orbital part of the tumor first rather than on the huge intradural extension of the tumor. The operative manipulations of such a large tumor cause swelling of the brain. That patient died of increased intracranial pressure. If we had removed the soft-tissue portion of the tumor first and then removed the orbital part, we might have succeeded.

Do you think that there was any tumor-invaded bone left in this case?

Dr. McCort: Since the operation was so recent, adequate postoperative films have not been obtained.

Dr. White: If there is, he will be quite certain to have at least a ten-year period of freedom from trouble. We have had 12 meningiomas that invaded the orbital bone. One patient died of recurrence after fifteen years; the others had more or less brief five-year follow-ups; so far they are all free. A number of other patients with meningiomas in other areas after subtotal removal had recurrences after fifteen years. One cannot always remove all the dura or bone that is involved. A few active tumor

cells, if they are left, may eventually cause a recurrence.

DR. CASTLEMAN: Was there any soft-tissue tumor?

DR. WHITE: There was none.

DR. CASTLEMAN: We usually think of meningioma as a soft-tissue tumor invading bone. In this slide you see solid, perfectly normal bone with bony trabeculae; in the marrow spaces are the spindle-shaped

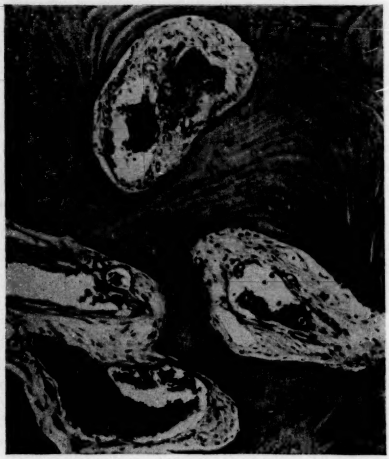

FIGURE 3.

tumor cells characteristic of meningioma (Fig. 3). The tumor is infiltrating through the marrow spaces, destroying bone as it goes.

DR. WHITE: A few meningiomas are malignant.

DR. EDWARD P. RICHARDSON, JR.: This was an unusual case of meningioma, in that the tumor tissue was found only in the bone and did not form a visible soft-tissue mass of any sort. The tumor cells closely resemble the nests of "arachnoid cells" normally found as scattered islands in the arachnoid membrane; it is presumably these cells that give rise to this tumor. They may be considered a form of connective-tissue cell, in that they are capable of producing fibroglial and collagenous fibers that can be demonstrated with appropriate staining methods. In our experience, the meningiomas that had malignant characteristics could be classified as fibrosarcomas.

CASE 38242

PRESENTATION OF CASE

A fifty-seven-year-old man was admitted to the hospital because of an abdominal mass.

The patient was in his usual state of good health until three months before entry, when he had the sudden onset of subcostal discomfort six hours after the ingestion of a fatty meal. An electrocardiogram was made, and following this he entered another hospital, where he remained for eleven days, for two of which he was in an oxygen tent. He was discharged on digitalis therapy and felt well until three weeks before admission, when concomitantly with a recurrence of the subcostal distress he noted for the first time a pulsating mass in the upper abdomen; two months before admission no abdominal mass was present when he was examined by his physician. His appetite had been poor for one month and he had lost eighteen pounds in weight. He had been slightly constipated and his stools had been a light yellow.

There had been no serious illnesses or operations in the past. He had noted palpitation for years, but there was no history of dyspnea, chest pain, reduced exercise tolerance, ankle edema, flatulence or food intolerance.

Physical examination revealed a robust man in no distress. The lungs were clear. The heart was not enlarged. The heart rate was irregular at a rate of 52 with no pulse deficit; there were no murmurs or friction rubs. In the epigastrium, a large fusiform pulsating mass was visible and palpable; it felt definitely cystic and the pulsations appeared expansile. Some observers thought that the mass could be ballotted slightly. The liver and spleen were not enlarged. The femoral pulses were present and full.

The hemoglobin was 11.4 gm. and the nonprotein nitrogen 25 mg. per 100 cc. An electrocardiogram showed auricular fibrillation at a rate of 50 and a QRS interval of 0.08 second. There were occasional ventricular premature beats. Voltage and axis were normal. There were low T waves in the limb leads, sagging ST segments and diphasic T waves in Leads V_4 and V_5. Roentgenograms of the chest showed the heart to be somewhat enlarged in the region of the left ventricle, the aorta to be moderately tortuous and the lungs to be clear. The gastrointestinal series demonstrated a huge mass in the upper abdomen that markedly displaced the body and antral portions of the stomach anteriorly and the duodenum to the right (Fig. 1). There was no obvious intrinsic involvement of the stomach or duodenum. There was calcification within the wall of the abdominal aorta. The spleen was normal in size.

An operation was performed on the eighth hospital day.

DIFFERENTIAL DIAGNOSIS

DR. WILLIAM R. WADDELL*: It might be well to examine the x-ray films and then to comment on

*Assistant in surgery, Massachusetts General Hospital.

some of the statements in the history and physical examination in the light of the x-ray interpretation.

DR. STANLEY M. WYMAN: The chest is not remarkable except for the rather definite enlargement of the heart in the region of the left ventricle. The film taken of the barium enema reveals the central transverse colon to be displaced downward, more to the right than to the left. This is seen to better advantage in the films of the upper gastrointestinal series, in which there is shown a large rounded

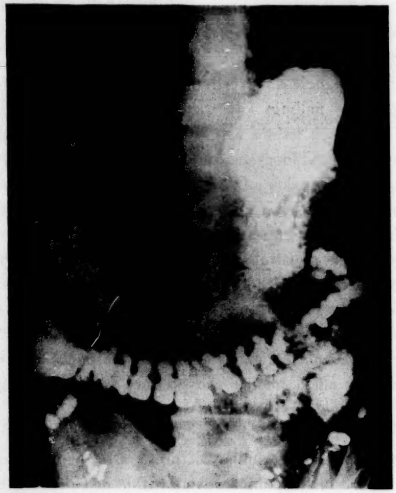

FIGURE 1.

pressure defect on the body and antrum of the stomach (Fig. 1). Some calcification is present in the abdominal aorta. This can be seen quite well just to the left of the lumbar spine, and it can be seen in the oblique film as a parallel streak of density anterior to the lumbar spine.

DR. WADDELL: Were there any demonstrable erosions of either ribs or vertebras?

DR. WYMAN: I do not see any.

The mass lies in the center and slightly to the right of the midline; the displacement by the mass of the second portion of the duodenum laterally and the third portion downward is very well seen. There is no evidence of calcium in the walls of the lesion. There is no evidence of distortion of the mucosal pattern of the stomach. As nearly as I can tell, the stomach is not involved in the process, although I cannot exclude the possibility that the mass might be adherent to the outer wall of the stomach.

DR. WADDELL: Can you definitely separate the mass from the liver? The comment in the description of the physical examination that the liver and spleen were normal in size appears in the x-ray report too. I do not see in these films a distinct separation between the shadow of the tumor and that of the liver.

DR. WYMAN: I can see the right border of the liver down in the gutter of the abdomen. I cannot be sure whether this is continuous with the liver or not; however, it does seem to lie more posteriorly than I would expect the liver to lie.

DR. WADDELL: There is no obvious calcification within the pancreas itself that I can see; the contour of the mass is rather smooth, not distinctly lobulated.

First, let me go through the history. I am unable clearly to relate the present difficulty with the illness that occurred three months before this admission. I presume that the electrocardiogram gave evidence of acute myocardial infarction and that he was treated in the other hospital for that condition, was digitalized and then was well from that time until the present illness brought him into this hospital. It is possible that the original symptoms were not directly related to his cardiac condition and that the cardiac abnormality was but an incidental finding. The similarity between the subcostal discomfort he had three months previously and that which brought him into the hospital this time might be additional evidence for that hypothesis. Lacking specific evidence for that, however, I shall have to assume that he probably had a myocardial infarction three months before admission.

I should like to comment briefly on the reportedly light-yellow stools. Patients are notoriously poor observers in this regard. Since he had no flatulence, diarrhea or fatty stools, I presume the patient had a normal supply of pancreatic enzymes. Furthermore, he was not reported to have been icteric.

It is easy to fasten special attention on the wording of the protocol, and I have been unable to escape that. The mass was described as fusiform and pulsating. I suppose it is of some importance to know in which direction the fusiform mass lay.

If it were with the small ends of the spindle pointing up and down, that would be of different significance from a transverse presentation. The examiners found the mass definitely cystic and stated that it "appeared expansile." This term is probably significant; we are all aware that it is difficult to be certain of expansile pulsation. Even the conventional test that we teach the second-year students of placing the hands on the sides of the pulsating mass and watching for them to be separated is not always accurate. When a rounded tumor or a mass of any shape lying on the aorta is pushed anteriorly, the dome of the tumor impinging on the hands gives an expansile character to the pulsation. The ballottability of the tumor is perhaps of considerable importance, since an aneurysm of the abdominal aorta is one of the conditions that will have to be considered rather strongly. It is unlikely that such a fixed organ as the aorta, even with an aneurysm attached to it, could be ballotted. If that observation is correct, it constitutes important evidence against the diagnosis of aneurysm. The presence of normal femoral pulses is perhaps meaningful; it might mean more if they were abnormal.

The anatomic location of the pulsating tumor in the upper abdomen immediately allows the reasonable exclusion of a good many diagnoses. I am familiar with the fact that bizarre findings occasionally occur with things such as ovarian tumors and masses in the sigmoid that present themselves in the upper abdomen, but there is really no evidence for suspecting such in this case. The epigastric mass described as pulsating suggests that an aneurysm may have been present. I am not inclined to consider that seriously for the following reasons: It was cystic; aneurysms, despite the fact that they are usually hollow and fluid containing, do not give that impression to the examiner. In fact, I think one is more often likely to think they are solid tumors because of thromboses and thickening of the wall due to increasing lamination as clot is deposited within. The x-ray films do not give any evidence that this was an aneurysm. A fair number of aneurysms cause erosion of the ribs or the vertebras. The aorta is in most cases a left-sided organ, and there was evidence that the mass presented toward the right. Even in bizarre forms of aneurysm with localized blowouts, it would be unusual for such a protrusion to extend over to the right side of the spine. They do peculiar things and may even give the roentgenographic appearance of lung tumors occasionally, despite the fact that they arise within the abdomen, but in general they confine themselves to the left side of the spine. The absence of pain is another reason for doubting the diagnosis of aneurysm. Although they are not all painful, rather a high percentage are. In general the pain is described as severe, not a vague epigastric discomfort. For these reasons I am inclined to discard the diagnosis of aneurysm and focus attention on other organs in the upper abdomen that might more reasonably be considered in the anatomic localization of this cystic tumor mass.

The pancreas is ideally located to account for the physical findings and roentgenographic abnormalities. Such lesions as cysts, either the true or the so-called pseudocysts, could account for the findings under discussion. Other cystic masses to be considered are those arising in the lesser omentum, — in the mesentery of the small bowel, near its base, — and in the omentum. The size of the mass is entirely consistent with those diagnoses, although it would tend to exclude some forms of pancreatic tumors and some types of cysts. The cystic adenomas and cystic adenocarcinomas arising in the pancreas are usually much smaller and produce symptoms long before they reach a great size.

The most common tumor in this location that could produce a similar picture is a retroperitoneal sarcoma or lymphoma arising within or close to the pancreas. Other lesions that occasionally produce a picture of this sort are extraluminal carcinomas of the stomach, which may not produce much disturbance of the mucosa, and occasionally lymphomas arising in but growing principally outside the stomach.

To return to the pancreas, I doubt that carcinoma of the pancreas needs serious consideration, as it usually destroys the patient before it reaches the size of this mass. Renal tumors deserve mention but not serious consideration because although they occasionally present toward the midline the duodenum is not displaced to the right. I suppose that carcinoma arising in the hepatic flexure of the colon could give such a picture but I do not consider that too seriously because of the character of the stools and the absence of symptoms pointing to the large intestine.

I have considered many possibilities and am not certain that an exact gross anatomic diagnosis is entirely possible on the basis of the available evidence. I am inclined to place pseudocyst of the pancreas as my first diagnosis and perhaps a retroperitoneal tumor, — sarcoma or lymphoma, — second.

A PHYSICIAN: Was the mass fluoroscoped?

DR. WYMAN: During the gastrointestinal series, yes.

DR. EDWARD HAMLIN, JR.: I was going to fall into the trap that perhaps Dr. Waddell escaped; I was going to call this an aneurysm as a more likely diagnosis than a cyst in the pancreas, but the evidence is not too clear cut.

DR. JOHN RAKER: I am afraid I would call it an aneurysm of the abdominal aorta.

DR. EDGAR B. TAFT: Would you consider a cyst of the left lobe of the liver?

DR. WADDELL: I did not consider that seriously because the examining physicians thought that the liver was of normal size. The smooth contour of the lesion makes less likely a matted mass of lymph nodes of retroperitoneal sarcoma or Hodgkin's disease.

DR. JOHN J. CRANLEY: The description of a pulsating mass is a little misleading. The first observer described it as pulsating, but the rest of the group were quite sure it was a transmitted rather than an expansile pulsation. The referral diagnosis was abdominal aortic aneurysm; the preoperative diagnosis was pseudocyst of the pancreas.

CLINICAL DIAGNOSIS

Pseudocyst of the pancreas.

DR. WADDELL'S DIAGNOSIS

Pseudocyst of the pancreas.

ANATOMICAL DIAGNOSIS

Pseudocyst of the pancreas.

PATHOLOGICAL DISCUSSION

DR. CRANLEY: At operation a large cyst was found that was filled with a clear fluid, and the wall was almost covered with white gritty material resembling calcium. Dr. Robert R. Linton was able to excise all visible white material and so considered it worth while to close the cyst in the hope that it would not re-form. The mass recurred in approximately one month, and at the second operation it was anastomosed to the stomach posteriorly. Nine months have passed, and the patient is entirely well and has gained twenty pounds.

DR. BENJAMIN CASTLEMAN: In the first operation three quarts of fluid was removed from the cyst, which was enormous and contained soapy necrotic material. The gall bladder, which was removed at that time, contained stones, so that he had the setup for the development of pancreatitis with the formation of a pseudocyst. This is not a true neoplasm such as a cystadenoma of the pancreas, but a false cyst formed as a result of pancreatitis.

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PROPOSED NEW MEDICAL SCHOOL IN MASSACHUSETTS

THE commission appointed by Governor Dever has recommended the establishment of a medical school in Boston under the auspices of the University of Massachusetts. The stated purpose of the new medical school is to increase the number of physicians practicing in the State and thus to relieve an alleged shortage. Without passing on the validity of this alleged shortage, one might question how far the establishment of a fourth school in Boston would contribute to the number of physicians settling in Massachusetts. The distribution of practitioners, after all, is determined by many factors other than the number of medical schools in a state. A recent survey indicated that the average per-capita income of physicians in New England was lower than in any other region of the country. When that fact is coupled with the observation that Massachusetts has almost the highest physician-to-population ratio of any state in the Union, it suggests that this state may be approaching a saturation point in relation to the rest of the country. If this is true, it means than an increased output of graduates from Massachusetts medical schools might be reflected in an increased export of physicians to states where physicians are scarcer and incomes higher and with little or no net increase in the number settling in Massachusetts.

Another factor that must be taken into consideration is the impact of a fourth school on the existing privately supported medical schools, which are at the moment struggling for their very survival.

As an alternative to a fourth undergraduate medical school, it is suggested that consideration be given to the establishment of a new and different type of graduate school of medicine in the State. The main purpose of this school would be to improve the training of interns and residents throughout the State by subsidizing the cost of their educational programs. If any hospital wished to participate in this program, its house staff could be registered as graduate students in the proposed State school and the cost of instruction borne by the State.

The effect of such a program, if it were properly administered, would be to bring the teaching in the hospitals throughout the State to a level hitherto available only at the so-called teaching hospitals. This would, of course, make appointments to internships and residencies in such hospitals much more sought after and should go far to relieve the shortage of interns noted by the Commission. Furthermore, it might assist the existing teaching hospitals in carrying the financial burden of the educational program.

There would be other desirable benefits from the program. It would improve the quality of medical care in the hospitals of the Commonwealth, and it would make Massachusetts an even more attractive place in which to practice medicine than it is now.

The organization of such a novel institution would raise many problems, including recruitment of qualified teaching personnel, determining and maintaining the degree of decentralization consistent with uniformly high standards, establishing effective relations with the existing medical schools and the Massachusetts Medical Society and so forth. However, with the support and co-operation of the medical schools and the Society, a state-wide program of graduate training that would be second to none could be implemented.

To the State it would offer certain particular advantages, not the least of which is that tangible results would be forthcoming almost immediately, whereas there would be about a ten-year lag between the passage of legislation authorizing an undergraduate medical school and the entering into practice of the first graduates of that school.

It would not involve the huge capital outlay necessary for a new undergraduate school, and the operating costs of administration and salaries of instructors would be a fraction of the cost of operating such a school. Finally, it would supplement rather than compete with the existing medical schools.

NEW THERAPEUTIC HAZARDS

NEW and apparently relatively specific antihypertension drugs have provided powerful tools for control of hypertension and some of its secondary effects.[1] In a series of 120 cases, blood pressure was significantly lowered in all and maintained at reasonable or normotensive levels in all but 1. Hexamethonium chloride and 1-hydrazinophthalazine have been used together in oral preparations, the former a ganglionic blocking agent, neutralizing in part the "neurogenic" influence, and the latter apparently inactivating some of the humoral pressor substances found in the condition.[2] Reversal of many signs and symptoms associated with chronic arterial hypertension has occurred. As with other new and potent therapeutic procedures, the scope and limitation of the method are incompletely defined, but already certain dangers have become apparent. Such profound alterations of long-standing abnormalities of the cardiovascular system are potentially hazardous.

In 35 cases of malignant hypertension, too rapid reduction in blood pressure has resulted in uremia (2 cases), cerebral vascular accidents (2 cases) and multiple myocardial infarcts (1 case). In malignant hypertension with nitrogen retention, the "low-salt syndrome" has occurred twice when salt was unrestricted. Six deaths have occurred while patients were on treatment, 1 of acute interstitial pneumonia, 2 of what may have been hexamethonium poisoning, 2 of unknown causes and 1 in a patient who developed tolerance to the drugs; all but 1 were in severe malignant stages with nitrogen retention. Less severe reactions included the recurrence of angina pectoris (2 cases) and high fever (1 case) induced by 1-hydrazinophthalazine (Apresoline), serous otitis media (6 cases), urinary retention (3 cases) and the expected symptoms of autonomic blockade (all cases to some degree). Severe prolonged hypotension has resulted from small doses of either drug in patients suffering from malignant hypertension, uremia, apoplexy and cardiac insufficiency. One case of sudden death occurred when both drugs were given together as an initial dose.

Of equal danger is the withdrawal of anti-hypertension agents from patients in malignant stages. Of 6 discontinuing medication voluntarily or on the advice of a physician, all have died within four days to four weeks later, 2 of pulmonary edema, 2 of uremia and 1 each of apoplexy and encephalopathy. Withdrawal from patients in "benign" stages resulted in return of previous signs and symptoms.

These two drugs, hexamethonium chloride and 1-hydrazinophthalazine, are powerful agents. Alteration of long-established abnormal hemodynamics is attended by potential dangers, especially when cardiovascular and renal diseases are present and drugs of this type are used. The possibilities of coronary thrombosis, thrombosis of cerebral arteries, reduction in renal blood flow leading to uremia, sudden death and other accidents dependent on hypotension are real. Relatively nontoxic in themselves, these two drugs used together cause profound changes in blood pressure that can be hazardous if they are not carefully employed, especially at the initiation of treatment.

Accidents can largely be avoided by hospitalization and careful observation, with frequent blood-pressure determination; by the initial use of small doses of only one of the drugs; by daily increase of dosages in small increments to cause slow but progressive declines in blood pressure; by repeated appraisal of the cardiovascular and renal status; by familiarity with both the direct actions of the drugs and their attendant side-effects; and especially by a knowledge of the alterations of cardiovascular and renal hemodynamics occurring in hypertension and the possible hazards of hypotension in this condition. Because of uncertainties about their long-term value and the possibilities of their producing serious and even fatal diseases, as so frequently occurs with chemotherapeutic agents, their use at present should be restricted to cases exhibiting pathologic changes that constitute "a real and present danger" to health.

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HELP FOR THE HANDICAPPED

Rehabilitation, according to the definition accepted by the Health Division of the United Community Services of Metropolitan Boston, is "the restoration of the handicapped person to the fullest physical, mental, social, vocational usefulness of which he is capable."

This definition, broken down into its component parts, describes medical rehabilitation as the "total effort of the medical and related professions to restore the handicapped to maximum capability"; vocational rehabilitation as that which will preserve or restore the ability of the handicapped person to work at the best possible economic level; and social rehabilitation as the efforts to assist handicapped persons to obtain the best possible social adjustment. It is all a part of the *social consciousness* that, dawning on the world nearly 2000 years ago, became evident as a great moral force in modern life in the early part of the nineteenth century.

As a special service in helping to make known the available resources for rehabilitation in the Greater Boston area, the Steering Committee of the Committee on Rehabilitation of the United Community Services issued in April a booklet of these facilities. Here are listed the 16 general hospitals in Boston that provide some type of help or guidance and the 9 hospitals in the metropolitan area that offer a comparable service; the 5 Federal hospitals; the 3 visiting-nurse associations and the various specialized facilities, which include those for tuberculous patients; the 12 facilities for the blind; the 5 agencies offering help to crippled children; the 9 catering to the needs of the hard of hearing; and the 6 key organizations that offer both training and placement.

Despite the conflicts that will always exist in human relations, these helping hands justify a belief that the faith of our fathers was not misplaced.

THE BLUE CROSS REPORTS

The report for 1951 of Massachusetts Hospital Service, Incorporated, calls attention to a significant year in the history of this voluntary insurance plan. There has been an increase over 1950 of approximately $3,500,000 in the amount of money taken in; this is due to a total gain in membership of 74,619, with a change of 289,055 subscribers from the $7.00 to the $10.00 certificate, and of 390,491 subscribers to the $12.00 certificate, with the resulting higher subscription fees.

This increase in fees collected has permitted the unassigned funds and contingency reserves to stand at the end of the year at $11,686,702.17 — $629,687.10 more than in 1950, although hospitalization expenses have gone up over four and a half million dollars in the period. Here is mirrored the inflationary trend that has made specters of so many of the business man's hopes, since the war, of normal recovery. To give a longer view of the trend, the report presents some comparisons with 1945, when the average daily patient cost of Massachusetts hospitals was $9.58, of which the payroll was just over half. The average cost in 1951 was $18.00 per day, with the cost of employees at nearly $15.00; there are still one and a half employees per bed, as in 1945.

A problem theoretically more susceptible to control than inflation is the use and abuse of the privilege of hospitalization on Blue Cross payment. Many physicians still fail to co-operate in that they

will send to the hospital patients who have no proper reason for being there, and some hospitals, when their census is low, will welcome these patients and will connive to keep beds occupied by those who no longer require hospital care.

These facts and figures give the reason for the rate increase that becomes effective on July 1.

The Philadelphia Female Medical College had fifty-two students on the catalogue. Eight ladies took the degree of M.D.

Boston M. & S. J., *June 16, 1852*

BOOKS RECEIVED

The receipt of the following books is acknowledged, and this listing must be regarded as a sufficient return for the courtesy of the sender. Books that appear to be of particular interest will be reviewed as space permits. Additional information in regard to all listed books will be gladly furnished on request.

Über die röntgenologischen Darstellungsmöglichkeiten des weiblichen Genitalapparates mit Hilfe von Jodol und Jodsol. By Dozent Dr. Med. Habil. J. Erbslöh, Bad Oldesloe. F°, cloth, 74 pp., with 64 illustrations. Stuttgart: Georg Thieme, 1951. DM 16.80. Distributed by Grune and Stratton, Incorporated, New York. (Fortschritte auf dem Gebiete der Röntgenstrahlen. Archiv und Atlas. Ergänzungsband 58.)

This monograph is devoted to the discussion of the radiologic examination of the female genital organs by the use of iodol and iodsol.

Clinical and Roentgenologic Evaluation of the Pelvis in Obstetrics. By Howard C. Moloy, M.D., M.Sc., assistant clinical professor of obstetrics and gynecology, Columbia University College of Physicians and Surgeons, and Sloane Hospital for Women. 8°, paper, 119 pp., with 68 illustrations. Philadelphia: W. B. Saunders Company, 1951. $2.50. (American Monograph Series.)

This monograph presents the results of the study of cephalopelvic disproportion over a period of eighteen years. The investigations were carried out by x-ray pelvimetry. A short bibliography is appended to the text. The monograph should be in all collections on obstetrics.

Radiologic Physics. By Charles Weyl and S. Reid Warren, Jr., Moore School of Electrical Engineering, University of Pennsylvania. With a foreword by Eugene P. Pendergrass, M.D., director of the Department of Radiology, University of Pennsylvania. Second edition. 8°, cloth, 491 pp., with illustrations. Springfield, Illinois: Charles C Thomas, 1951. $10.50.

This new edition of a standard reference book, first published in 1941, has been thoroughly revised to bring the subject up to date. The text is divided into two parts: one on scientific method, electromagnetism and electromagnetic devices; the other, on radiant energy and its interrelations with matter. This last part contains material on diagnosis and therapeutics of the x-rays. Lists of references are appended to the various chapters, and there are indexes of authors and subjects. The book is recommended for all medical libraries and should be in the collections of all radiologists.

Hormones and Body Water. By Robert Gaunt, Ph.D., and James H. Birnie, Ph.D., Department of Zoology, Syracuse University. 8°, cloth, 57 pp. Springfield, Illinois: Charles C Thomas, 1951. $2.25. (Publication No. 103, American Lecture Series.)

This small monograph discusses in particular the adrenal hormones and water metabolism.

Renal Pelvis and Ureter. By Peter A. Narath, M.D., adjunct professor of urology, New York Polyclinic Medical School and Hospital. 4°, cloth, 429 pp., with 264 illustrations. New York: Grune and Stratton, Incorporated, 1951. $12.50.

This special monograph is the result of many years' work. The various chapters discuss the embryology, anatomy and histology of the renal pelvis and the ureter, anomalies and malformations, dynamics, tonus of the upper urinary tract and resorption and absorption in this tract and various forms of extravasations. The final chapter is devoted to the roentgenography of the tract. The book is well illustrated with 264 figures, some in color, including many roentgenograms. There is an extensive bibliography of 28 pages, arranged chronologically, and there are indexes of authors and subjects. The book should be in all medical libraries and in the collections of urologists.

Gesundheitsbüchlein für die Tropen: Ratschläge für Auswanderer; sowie Regeln zur hygienischen Lebensweise und zur Verhütung von Krankheiten und gesundheitlichen Schäden in den warmen Ländern. By Dr. Med. Ernst von Haller, Lower Buchanan, Grand Bassa County, Liberia. With a foreword by Prof. Dr. E. G. Nauck, Direktor des Bernhard-Nocht-Instituts fur Schiffs- und Tropen-Krankheiten. 8°, cloth, 92 pp., with 11 illustrations. Stuttgart: Georg Thieme, 1951. Kart. DM 5.70. Distributed by Grune & Stratton, Incorporated, New York.

This small book is written primarily for travelers in the tropics. There is a special chapter on general hygienic rules, followed by chapters on preventive measures and on the common diseases of tropical countries. There is a good index, and the publishing is excellent. The book should prove valuable to German-reading persons.

Studies of Undernutrition, Wuppertal 1946–49. By members of the Department of Experimental Medicine, Cambridge, and associated workers. 8°, paper, 404 pp., with 62 plates. London: His Majesty's Stationery Office, 1951. 12s. 6d. (Privy Council, Medical Research Council Special Report Series, No. 275.)

Between the years 1919 and 1922 the Medical Research Council, in conjunction with the Lister Institute of Preventive Medicine, maintained in Vienna a group of British scientists for the study of the deficiency diseases then prevalent in that part of Europe. The valuable results of this study encouraged the Council to make a study of conditions in Germany in 1946. This report is the result of that investigation. The subject is completely covered, under a number of headings. Each chapter is documented with a list of references. Hunger edema is exhaustively discussed; the bibliography covers 18 pages. The lack of an index is regrettable. The book should be in all collections on the subject.

The Healing Touch. By Harley Williams, M.D. 12°, cloth, 370 pp., with 8 illustrations. Springfield, Illinois: Charles C Thomas, 1951. $6.75.

Dr. Williams, in his new book of a semipopular character, presents a series of biographies of outstanding foreign physicians and a historical sketch of modern medicine in the United States. The biographies include among others William Jenner, Charles E. Brown-Sequard and Florence Nightingale. The chapter on American medicine stresses the Mayos and their clinic and the Baltimore group of Welch, Halsted and Harvey Cushing. The text is written in an easy style; the publishing is good. The book should be in all history of medicine and popular medical collections.

From the Dugout to Hilltop. By Margaret R. Stewart, M.D. 8°, cloth, 233 pp. Culver City, California: Murray & Gee, Incorporated, 1951. $3.75.

Dr. Stewart has written an autobiography, stressing especially her medical career, covering a period of forty-five years, twenty-five of which were spent in the Public Health Service and the Veterans Bureau of the Federal Government. She had much experience as an administrator of tuberculosis hospitals. This life story of a successful woman physician should be in all medical-history collections.

Surgical Treatment of the Motor-Skeletal System. Supervising editor, Frederic W. Bancroft, M.D., professor of clinical surgery, New York Medical College, director of surgery, Hasbrouck Heights Hospital, Hasbrouck Heights, New Jersey, senior consulting surgeon, Bronx Veterans Hospital, consulting surgeon, New York Infirmary for Women and Children, Lincoln and Harlem Hospitals, New York, New York, North Country Community Hospital, Glen Cove, New York, Paterson General Hospital, Paterson, New Jersey, and Stamford Hospital, Stamford, Connecticut. Associate editor, Henry C. Marble, M.D., consultant, Fracture Service, Massachusetts General Hospital, consulting surgeon, Veterans Administration Cushing and Bedford hospitals, surgeon, Chelsea Memorial Hospital, Chelsea, consulting surgeon, Faulkner Hospital, and instructor in surgery, Harvard Medical School courses for graduates. 4°, cloth. (Part I: Deformities, paralytic disorders, muscles, tendons, bursae, new growths, diseases of bones and joints, amputations; 636 pp., with 519 illustrations and 1 color plate. Part II: Fractures, dislocations, sprains, muscle and tendon injuries, birth injuries.) 664 pp., with 530 illustrations and 2 color plates. Philadelphia: J. B. Lippincott Company, 1951. $24.00.

This authoritative book was first published in 1945. This new edition has been thoroughly revised and much of the material rewritten. A new chapter has been added on the physiology of bone repair. The text is the joint work of 46 specialists. There are indexes of authors and subjects; the publishing is excellent. The set should be in all surgical and orthopedic collections.

Autopsy Diagnosis and Technic. By Otto Saphir, M.D., pathologist, Michael Reese Hospital, and clinical professor of pathology, University of Illinois Medical School, Chicago. With a foreword by Ludvig Hektoen, M.D. Third edition. 12°, cloth, 471 pp., with 80 illustrations and 20 tables. New York: Paul B. Hoeber, Inc., 1951. $6.00.

This standard handbook was first published in 1937 and the present edition has been revised to bring it up to date. There is a good index, and the book is well published. It should be in all medicolegal libraries.

Congenital Dislocation of the Hip. By Julius Hass, M.D. 8°, cloth, 405 pp., with 134 illustrations. Springfield, Illinois: Charles C Thomas, 1951. $12.50.

Dr. Hass has written a comprehensive monograph on congenital dislocation of the hip and discusses in detail open and closed reduction and other methods of treatment. The opening chapters are devoted to classification, pathology, etiology, symptoms, diagnosis and prophylaxis. The work is based on more than 2000 cases treated at the Orthopedic University Clinic of Vienna and in New York City. There is a bibliography of 69 pages and indexes of authors and subjects. The book should be in all collections on orthopedic surgery.

Die hämolytischen Syndrome im Kindesalter. By Priv.-Doz. Dr. Conrad Gasser, Zurich. With a preface by Prof. G. Fanconi. 8°, cloth, 322 pp., with 101 illustrations. Stuttgart: Georg Thieme, 1951. Ganzleinen DM 45. — Distributed by Grune and Stratton, Incorporated, New York.

Dr. Gasser has written a comprehensive monograph on the hemolytic syndrome in children. Toxic and hemolytic anemias are discussed at length. Eighty illustrative cases are interspersed throughout the text. There is a bibliography of 32 pages. The publishing is excellent. The book should be in all pediatric and blood collections.

Fortschritte der Tuberkuloseforschung; Advances in Tuberculosis Research; Progrès de l'Exploration de la Tuberculose. Volume IV. Edited by H. Birkhäuser, Basel, and H. Bloch, New York. 8°, cloth, 308 pp. Basel: S. Karger, Ltd., 1951. $10.50. Distributed by Interscience Publishers, Incorporated, New York.

This volume is part of a valuable series on tuberculosis. It contains eight papers on various aspects of the subject, including one on new approaches to the study of experimental infection, by E. M. Brieger, of Cambridge, England. There is a good index, and the publishing is well done. The complete series should be in all tuberculosis collections.

Grouping, Typing and Banking of Blood. By Otakar J. Pollak, M.D., Ph.D., director, Blood Bank; chief of departments of anatomical, clinical and experimental pathology and director, School for Medical Technologists, Quincy City Hospital, Quincy, Massachusetts; and consultant pathologist, Jordan Hospital, Plymouth, Massachusetts. Springfield, Illinois: Charles C Thomas, 1951. $5.75.

This new book has been written principally for blood-bank personnel and others interested in the subject. The subject is thoroughly covered, and there are chapters on whole-blood transfusion and the use of blood fractions. There is a bibliography of 100 titles. The book should be in collections on the subject.

NOTICES

ANNOUNCEMENT

Dr. William P. Ridder announces the opening of his offices for the practice of general surgery at 30 Beach Street, Wollaston, and 39 Bay State Road, Boston.

ANNUAL NARCOTIC REGISTRATION

Physicians are reminded that annual narcotic registration returns must be filed with the collector by July 1, or penalty attaches.

Form 678 was sent for this purpose to all registrants in May; if this has not been received or further information is desired, inquiries should be directed to Narcotic Section — Mr. Chester H. Clark, COpley 7-5700, line 386.

SOCIETY MEETINGS AND CONFERENCES

JUNE 18–20. Massachusetts Public Health Conference. Amherst. Page 879, issue of May 29.

JUNE 18–20. New England Health Institute. Page 760, issue of May 8, and page 879, issue of May 29.

JUNE 19–21. American Association of Genito-Urinary Surgeons. Page 434, issue of March 13.

JUNE 21–28. Springfield Hospital. Page 838, issue of May 22.

JUNE 22–26. American Society of Medical Technologists. Twentieth Annual Convention. Portland, Oregon.

JUNE 23–25. Military-Civilian Medical Symposium, Murphy Army Hospital, Waltham.

JUNE 24. South End Medical Club. Page 882, issue of May 29.

JULY 7–11. International Congress of Dietetics. Page 434, issue of March 13.

JULY 7–12. International Diabetes Federation. Page 316, issue of February 21.

JULY 8–11. Thirteenth British Congress of Obstetrics and Gynaecology. Page 916, issue of December 6.

JULY 8–14. Commonwealth and Empire Health and Tuberculosis Conference. Page 792, issue of November 15.

JULY 14–18. Tuberculosis Symposium. Page 800, issue of May 15.

JULY 14–19. International Congress of Physical Medicine. Page 998, issue of June 28.

JULY 24–26. Conference on Aging. Page 559, issue of April 3.

AUGUST 25–29. American Congress of Physical Medicine. Page 476, issue of March 20.

AUGUST 31–SEPTEMBER 6. Interamerican Congress of Cardiology. Page 422, issue of March 27.

SEPTEMBER 7–9. Combined session of the New Hampshire and Vermont State Medical Societies. Mount Washington Hotel, Bretton Woods, New Hampshire.

OCTOBER 28–30. New England Postgraduate Assembly. Hotel Statler, Boston.

OCTOBER 29. New England Obstetrical and Gynecological Society. Annual Meeting. Hotel Somerset, Boston.

NOVEMBER 7–9 AND 10–21. Courses in Laboratory Diagnosis of Tuberculosis. Page 354, issue of February 28.

JULY, 1953. International Congress on Medical Librarianship. Page 316, issue of February 21.

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING THURSDAY, JUNE 19

THURSDAY, JUNE 19

8:30–10:00 a.m. Fracture Conference. Boston City Hospital.

*9:00–10:00 a.m. Grand Rounds. Robert Breck Brigham Hospital.

9:00 a.m. Cardiac Rounds. House of the Good Samaritan.

*4:00–5:00 p.m. Medical Division Lecture. Mount Auburn Hospital, Cambridge.

5:00 p.m. Case presentation and pathological discussion followed by a subject of special presentation. Joslin Amphitheatre, New England Deaconess Hospital.

(*Notices concluded on page xi*)